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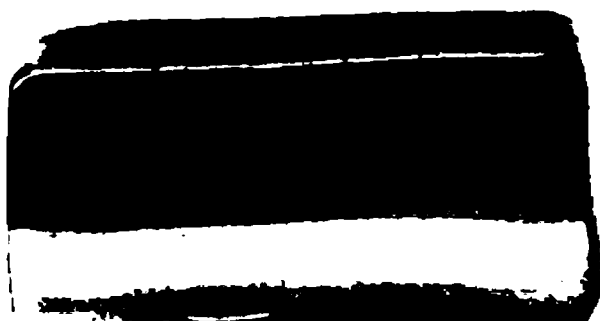
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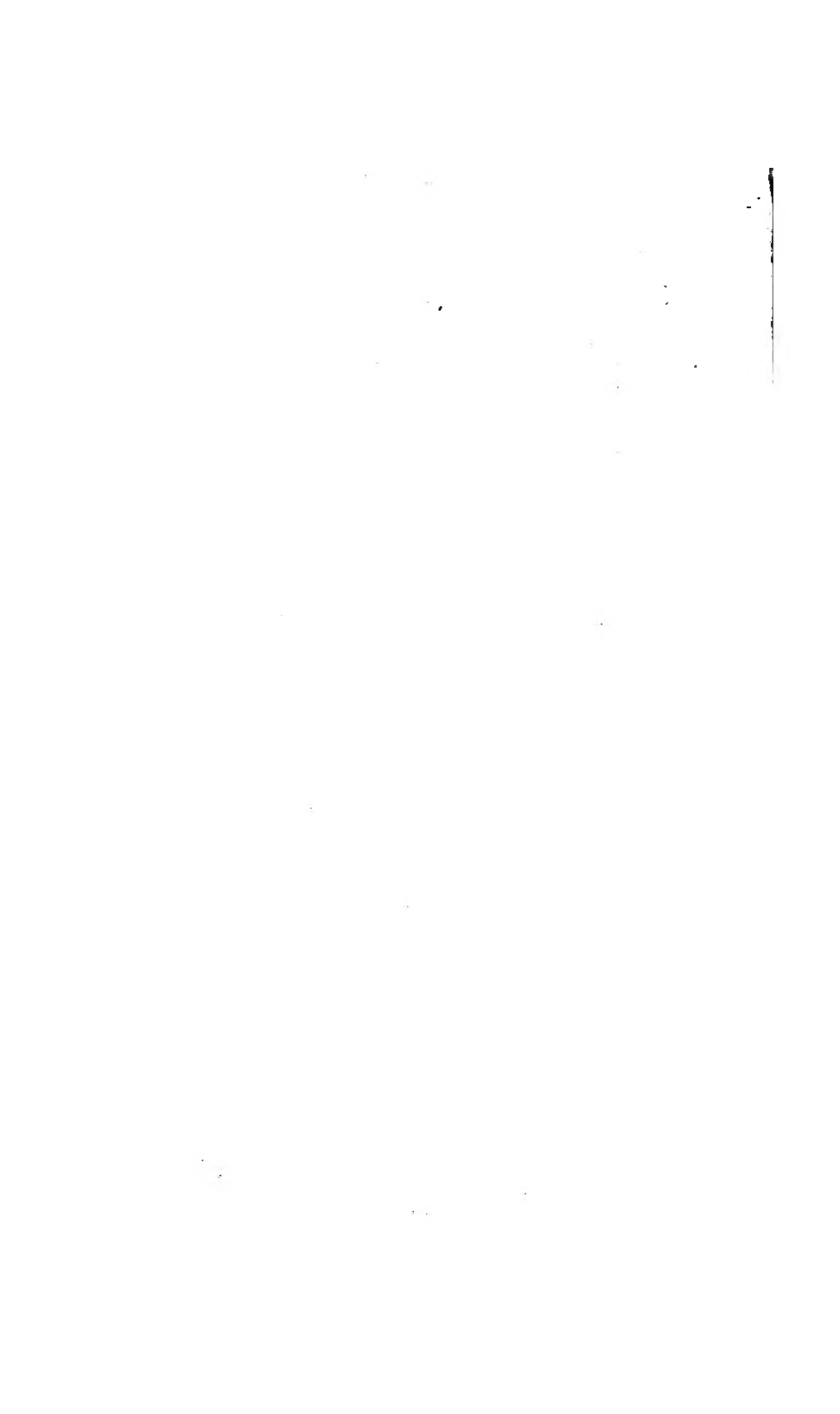
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LEGISLATIVE DOCUMENTS

SUBMITTED TO THE

Twenty-eighth General Assembly

OF THE

STATE OF IOWA

Which Convened at Des Moines, January 8, 1900

LESLIE M. SHAW,	-	-	-	-	-	-	Governor
J. C. MILLIMAN,	-						Lieutenant-Governor and President of the Senate
G. W. DOBSON,	-	-	-	-	-		Secretary of State
FRANK F. MERRIAM,	-	-	-	-	-		Auditor of State
JOHN HERRIOTT,	-	-	-	-	-		Treasurer of State
RICHARD C. BARRETT,		-					Superintendent of Public Instruction
MILTON REMLEY,	-	-	-	-	-		Attorney-General
D. H. BOWEN,	-	-	-				Speaker of the House of Representatives

VOLUME IV

CONTENTS OF VOLUME I.

- 1A. Message.**
 - 1B. Inaugural.**
 - 1C. Report of Auditor.**
 - 1D. Report of Treasurer.**
 - 1E. Report of convictions.**
-

CONTENTS OF VOLUME II.

- 2A. Report of Superintendent of Public Instruction.**
 - 2B. Report of State University.**
 - 2C. Report of State Normal School.**
 - 2D. Report of State Agricultural College.**
 - 2E. Report of Librarian.**
 - 2F. Report of State Historical Society.**
 - 2G. Report of Historical Department.**
 - 2H. Report of Custodian of Public Buildings.**
 - 2I. Report of Land Department.**
 - 2J. Report of Oil Inspectors.**
-

CONTENTS OF VOLUME III.

- 3A. Railroad Commissioners' Report for 1898.**
 - 3B. Railroad Commissioners' Report for 1899.**
 - 3C. Railway Assessment for 1899.**
 - 3D. Railway Assessment for 1900.**
 - 3E. Report on Pardons.**
 - 3F. Rules of the Twenty-eighth General Assembly.**
 - 3G. Report of Mine Inspectors.**
-

CONTENTS OF VOLUME IV.

- 4A. Board of Health Report.**
- 4B. Bureau of Labor Statistics Report.**
- 4C. Dairy Commissioner's Report for 1898.**
- 4E. Dairy Commissioner's Report for 1899.**
- 4F. Pharmacy Commissioners' Report.**
- 4G. State Veterinary Surgeon's Report.**

CONTENTS OF VOLUME V.

- 5A. Report of Attorney-General.**
- 5B. Report of Adjutant-General.**
- 5C. Weather and Crop Service Report for 1898.**
- 5D. Weather and Crop Service Report for 1899.**
- 5E. Report of Improved Stock Breeders' Association.**
- 5F. Report of Fish Commissioner.**

CONTENTS OF VOLUME VI.

- 6A. Report of Board of Control.**

CONTENTS OF VOLUME VII.

- 7A. Insurance Report for 1899.**
- 7B. Volume I. Insurance Report for 1900.**
- 7C. Volume II. Insurance Report for 1900.**

TENTH

BIENNIAL REPORT

OF THE

BOARD OF HEALTH

OF THE

STATE OF IOWA

FOR THE

PERIOD ENDING JUNE 30, 1899.

DES MOINES:
F. B. CONAWAY, STATE PRINTER.
1899.

STATE OF IOWA,
OFFICE OF SECRETARY STATE BOARD OF HEALTH, }
DES MOINES, July 1, 1899.

To Leslie M. Shaw, Governor of Iowa:

SIR—In accordance with the provisions of section 2565 of the code, the Tenth Biennial Report of the State Board of Health, for the period ending June 30, 1899, is herewith presented.

J. F. KENNEDY,
Secretary.

Members of the Board.

MILTON REMLEY, Attorney-General, Des Moines, *ex-officio*.

JAMES I. GIBSON, State Veterinary Surgeon, Denison, *ex-officio*.

WARREN DICKINSON, Civil Engineer, Des Moines.

	TERM EXPIRES.
ROBERT E. CONNIFF , Sioux City (R).....	January 31, 1900
J. A. SCROGGS , Keokuk (R).....	January 31, 1901
J. C. SHRADER , Iowa City (R)	January 31, 1902
WALTON BANCROFT , Keokuk (H).....	January 31, 1903
E. A. GUILBERT , Dubuque (H).....	January 31, 1904
J. A. MCKLVEEN , Chariton (E)	January 31, 1905
HENRY MATTHEY , Davenport (R).....	January 31, 1906

PREFACE.

The statute creating the State Board of Health makes it the duty of the Secretary of the Board, in the biennial report to the Governor, to "include so much of its proceedings, such information concerning vital statistics, such knowledge respecting diseases, and such instruction on the subject of hygiene as may be thought useful for dissemination among the people, with such suggestions as to further legislation as may be thought advisable."

In compiling the following report I have endeavored to conform fully to the requirements above stated.

A glance at the table of contents will show the wide range of sanitary subjects considered. The report on smallpox is quite voluminous, giving, as it does, a detailed account of the most widespread visitation of this disease in the history of the state.

There are a number of exceedingly interesting and valuable reprints that I am able to reproduce through the kindness of their writers and publishers.

Under the code a number of circulars of the Board were revised and republished. They form a part of this report, as well as the laws relating to public health and safety, which are codified.

A prominent feature of the report is the number of cuts illustrating some of the articles.

June 30, 1899.

J. F. KENNEDY.

CONTENTS.

Board Meetings.....	I
Smallpox in Iowa.....	II
Vaccination.....	III
Leprosy in Iowa.....	IV
Embalmers' Department.....	V
Communicable Diseases.....	VI
Barbers and Hair Dressers.....	VII
Railroad Accidents.....	VIII
Vital Statistics.....	IX
Water.....	X
Food Preservatives.....	XI
Health Literature.....	XII
Further Legislation.....	XIII
Sanitary Bacteriology.....	XIV
Disinfection.....	XV
Public Parks.....	XVI
Hints on Rural School Grounds....	XVII
Health of Children Fed on Cows' Milk.....	XVIII
Milk as Food.....	XIX
Care of Milk on Farm.....	XX
Meats—Composition and Cooking.....	XXI
Tuberculosis in Cattle.....	XXII
Bovine Tuberculosis in Relation to Man.....	XXIII
Ventilation and Outdoor Life in Its Relation to Pul- monary Consumption.....	XXIV
Hygienic Treatment of Tuberculosis.....	XXV
Anthrax.....	XXVI
Evolution of Sanitation in Iowa.....	XXVII
Children's Eyesight and School Desk.....	XXVIII
The Money Value of Health..	XXIX
State Care for Epileptics.....	XXX
Our Chronic Insane.....	XXXI
Sewage Disposal on the Farm.....	XXXII
Official Circulars.....	XXXIII
Appendix—Sanitary Code.....	XXXIV
Index	XXXV

I

MEETINGS OF THE BOARD.

AUGUST MEETING, 1897.

Pursuant to adjournment the Iowa State Board of Health met in the rooms of the Board of Health, August 5, 1897, and was called to order at 10 A. M. by the President—Dr. J. M. Emmert.

There were present, Drs. Emmert, Guilbert, Shrader, Conniff, Scroggs, Bancroft, Carter, Gibson and Warren Dickinson, civil engineer.

After the reading and correction of the minutes the quarterly report of the Secretary was read and considered *seriatim*.

DEPUTY OIL INSPECTOR.

The appointment by Hon. L. A. Brewer, State Oil Inspector, of Mr. E. A. Ballard, Iowa City, as Deputy Oil Inspector, *vice* W. H. Goodrell, deceased, was confirmed by the Board.

The Secretary was directed to ask the opinion of the Attorney-General as to the necessity of holding a meeting of the Board the first week in October for the purpose of adopting, or re-adopting, rules and regulations under the new code which goes into effect October 1st—the question being, whether all the rules and regulations of the Board, heretofore in force under the code of 1873, were not repealed by the enactment of the new code.

QUARANTINE RULES.

Dr. Guilbert offered the following which was adopted and ordered published in the *Bulletin*:

Resolved, That the Iowa State Board of Health re-affirms its heretofore rules of quarantine in infectious diseases, and its stern prohibition as to public funerals in such cases; and therefore it disapproves of recent transactions in the city of Decorah, during which the wholesome rules of the Board were palpably violated, as we are informed.

MALLIEN AND TUBERCULIN.

The following rules were presented by Dr. Gibson and adopted by the Board:

RULE 1. In cases of suspected glanders or farcy when the symptoms do not warrant the State Veterinarian in condemning the animal, the mallien test shall be recognized as a valuable diagnostic.

RULE 2. In suspected cases of bovine tuberculosis, the tuberculin test shall be recognized as a valuable diagnostic test.

COMMITTEE ON TUBERCULOSIS.

President Emmert appointed the following standing Committee on Tuberculosis: J. C. Shrader, J. I. Gibson and W. Bancroft.

CORPSES.

The Committee on Corpses, through their chairman, Dr. Shrader, made the following report which was adopted and the Iowa delegates were instructed to vote for the same:

Mr. President and Gentlemen:

At a meeting held at Cleveland, Ohio, June 9, 1897, a committee was appointed to revise the rules and regulations now in use for the preparation and shipment of dead bodies. The rules that are now in use and have been for some few years last past, were mainly formulated by the Iowa Board and were considered so nearly perfect at the time, that they were adopted by the Association of Railway Baggage Agents. But time has shown and the great advances that have been made by the Funeral Directors' Association, now enable us to safely and wisely change these rules. That they should be uniform in all states and the same be adopted by the Funeral Directors' Association and also by the Association of Railway Baggage Agents, is patent to everyone. In the *Ohio Sanitary Bulletin* for July, are a set of rules,* that have been carefully formulated and will come up for adoption by the State and Provincial Boards of Health, at the approaching Nashville meeting. I therefore offer these rules for adoption by this Board.

FINANCIAL.

The Secretary reported the following expenses for the quarter ending July 31, 1897.

Board meeting May 7, 1897.

*These rules were to be considered by the conference of State and Provincial Boards of Health of North America, to be held in Nashville, and if adopted by that body the Iowa State Board of Health would put them in operation.

FINANCIAL STATEMENT.

13

MEMBERS' EXPENSE ACCOUNT.

J. M. Emmert	\$ 21.00	
J. C. Shrader	22.50	
R. E. Conniff	33.00	
E. H. Carter	9.00	
E. A. Guilbert	35.50	
J. A. Scroggs	30.00	
J. I. Gibson	23.00	
Warren Dickinson	9.00	
Total		\$ 212.00
Paid by State warrant No. 14,520.		

CURRENT EXPENSES FOR MAY.

J. F. Kennedy, Secretary	\$ 100.00	
L. F. Andrews, Clerk	75.00	
Iowa Printing company—		
Printing <i>Bulletin</i>	\$ 40.00	
Binding Records	26.00	
		66.00
Geo. A. Miller Printing company—		
2,000 Form 130 B	\$ 21.93	
2,000 Form 99 B	13.00	
		34.93
J. F. Kennedy, editing <i>Bulletin</i>	16.67	
D. Appleton & Co., <i>Popular Science Monthly</i>	5.00	
<i>Annals of Hygiene</i>	2.00	
Western Union Telegraph	3.07	
Norman Lichty, wood alcohol	1.25	
U. S. Express company .....	.30	
Adams Express company .....	.30	
Carter & Hussey—		
1 gross pencils	\$ 7.50	
125 mailing tubes	3.50	
750 Form 3 A	1.00	
400 addressed envelopes	1.00	
1000 Form 14 A	1.00	
		14.00
Total		\$ 318.52
Paid by State warrant No. 15,240.		

CURRENT EXPENSES FOR JUNE.

J. F. Kennedy, Secretary	\$ 100.00	
L. F. Andrews, Clerk	75.00	
Iowa Printing company—		
Printing <i>Bulletin</i>	\$ 37.00	
3,000 letterheads	35.00	
		72.00
Gertrude Kennedy—		
Mailing May <i>Bulletin</i>	\$ 4.00	
Mailing June <i>Bulletin</i>	4.00	
		8.00

Western Union Telegraph company.....	6.00	
<i>Domestic Engineering</i>	2.00	
Norman Lichty, wood alcohol.....	1.25	
Carter & Hussey—		
200 death returns (books).....	\$ 2.60	
200 birth returns (books).....	2.60	
200 death returns (sheets).....	6.00	
200 birth returns (sheets).....	6.00	
300 disinterment permits.....	4.00	
Special for <i>Bulletin</i>.....	.75	
Binding <i>Bulletin</i>	6.00	
400 envelopes.....	1.00	
		28 95
Total		\$ 294.20
Paid by State warrant No. 15,626.		

CURRENT EXPENSES FOR JULY.

J. F. Kennedy, Secretary.....	\$ 100.00	
L. F. Andrews, Clerk.....	75.00	
Iowa Printing company, printing <i>Bulletin</i>	37.50	
E. H. Hunter, postage.....	20.00	
Norman Lichty—		
3 dozen soap.....	\$ 2.60	
1 dozen blacking.....	1.20	
1 gallon wood alcohol.....	1.25	
		5.05
Gertrude Kennedy, mailing <i>Bulletin</i>	4.00	
Carter & Hussey, 100 Form 29 B.....	3.00	
Western Union Telegraph company.....	3.42	
United States Express company.....	2.06	
American Express company.....	1.25	
<i>Health Magazine</i>	1.00	
Wells Fargo & Co. Express.....	.40	
Total		\$ 252.68
Paid by State warrant No. 16,031.		

RECAPITULATION.

Board meeting.....	\$ 212.00
May expenses.....	318.52
June expenses.....	294.26
July expenses.....	252.68
Total	\$ 1,077.46

The financial report of the Secretary was received by the Board and referred to the auditing committee, who later reported as follows:

The Auditing Committee report upon the Secretary's financial report for the quarter ending July 31st, as follows:

We have found proper vouchers filed for all bills rendered and their amounts with warrants drawn from the State Auditor's office.

(Signed)

WARREN DICKINSON,
J. C. SHRADER,
J. I. GIBSON.

On motion, the Board adjourned to meet at the call of the President.

SEPTEMBER-OCTOBER MEETING, 1897.

The Board convened in special session upon the call of the President, J. M. Emmert, on September 30, 1897, at 10 A. M.

There were present Drs. Emmert, Bancroft, Guilbert, Scroggs, Shrader, Carter, and Gibson.

The minutes of the last meeting were read and approved.

The object of the special meeting was declared to be to review the rules and regulations of the Board; to compare them with the provisions of the new code, which goes into effect October 1st; to eliminate whatever was found to be in conflict therewith; to enact such additional rules as may be required under the code; and to consider such other business as might appropriately come before the Board at this time.

After transacting some routine business, the Secretary laid before the Board for revision, if needed, the circulars containing the rules and regulations respecting quarantine and disinfection; contagious and infectious diseases in the public schools; rules for the guidance and government of local boards of health in cities and towns, and in district townships; forms of ordinances for cities and towns; and rules and regulations for adoption by district townships. These documents were distributed by the President to the appropriate committees with instructions to report at 9 A. M., October 1st, whereupon the Board adjourned.

Board reconvened at 9 A. M., October 1st, and was called to order by President Emmert.

There were present, Emmert, Guilbert, Bancroft, Scroggs, Carter, Gibson, and Shrader.

Dr. Carter read an extract from the Iowa State *Register* in which the State Board of Health was made to declare that a certain mineral spring in the city of Des Moines was danger-

ously contaminated with sewage. By a unanimous vote it was declared that the State Board of Health had never made any examination or investigation of the water in question and never at any time or in any manner had given any expression as to the safety or the therapeutic properties of the water; and the Secretary was directed to furnish a copy of the resolution to the *Register* for publication.

The Secretary laid before the Board the following opinion from the Attorney-General, relative to the necessity of a special meeting to re-enact and revise the rules and regulations made by the Board under the previous statute, before they can become effective under the new code.

IOWA CITY, September 6, 1897.

Dr. J. F. Kennedy, Secretary State Board of Health, Des Moines, Iowa:

DEAR SIR—Your favor at hand, requesting my opinion as to whether or not, it will be necessary for the State Board of Health to meet in October and re-enact rules and regulations made by the Board under the statutes heretofore existing—in other words: Are such rules and regulations rendered nugatory by the operation of the new code, which repeals all prior statutes, provided such rules and regulations are not in conflict with the new code?

In my judgment it is not necessary. The reservations in the repealing of the prior statutes, are sufficient to protect acts done under prior statutes. The new code contains practically the same language with reference to the authority of the Board to make rules and regulations, and the adoption of the code would only render nugatory such rules and regulations as would be in conflict with the new code. If there are no rules and regulations which are in conflict with the new code they need not be changed.

Yours truly,

MILTON REMLEY,
Attorney-General.

The committees to whom the various circulars had been referred, reported that the time was too short for judicious revision at this meeting and asked further time, which was granted, and they were instructed to report at the regular meeting to be held in November.

Dr. Guilbert presented the following resolution, which was unanimously adopted and ordered spread upon the minutes and published in the *Bulletin*:

WHEREAS, The Health and Medical Examiners' Boards have reached a period in their career when reorganization becomes necessary under the new code, therefore be it

Resolved, That during the thirteen eventful years, our well equipped and courteous Secretary, Dr. Kennedy, has filled that position, he has

done his full share in placing these Boards in the position they occupy in the front of the sanitary army of the day. We hold him, therefore, in honor in our hearts, and we are glad to believe that this association begun in concord long ago, will continue in unity to the end.

On motion the meeting adjourned.

NOVEMBER MEETING, 1897.

The semi-annual meeting of the State Board of Health, pursuant to adjournment met at the office of the Board, Capitol building, November 9th, and was called to order by President Dr. J. M. Emmert.

There were present Drs. J. M. Emmert, Atlantic; E. H. Carter, Des Moines; E. A. Guilbert, Dubuque; W. Bancroft, Keokuk; R. E. Conniff, Sioux City, and J. I. Gibson, V. S., Denison.

The minutes of the previous meeting were read and approved.

The report of the Secretary was laid before the Board and duly considered.

The Secretary, in his report, called attention to the prevalence and character of infectious diseases throughout the state. He said: "Correspondence shows much better preparation on the part of the local boards to circumscribe and stamp out these diseases. The local boards are much more generally organized and in good fighting trim.

"The instances where physicians contravene the prudent endeavors of local boards, by failing to report, or by falsely diagnosing or naming these diseases; and by minifying the importance of quarantine, are growing less and less frequent.'

In regard to the

BIENNIAL REPORT

he said: "The Ninth Biennial report of this Board has been printed, and is now in the hands of the binder. It will be a volume of about 400 pages and will contain a large amount of information respecting sanitary matters, that is up to date. Some of the articles are illustrated. I believe the report will be found creditable, not only to the Board, but to the state at

large; that it will compare favorably with any other public document prepared by the state."

Respecting

DISINTERMENT PERMITS

the Secretary said: "Since the notice given of the penalty for digging up the body of a human being without legal authority, undertakers and sextons of cemeteries are conforming much more generally to our rules respecting disinterment "

"There have been issued since the last meeting of the Board, 123 disinterment permits."

TRANSPORTATION OF CORPSES.

The following rules for the transportation of corpses, adopted by the American Conference of State and Provincial Boards of Health; by the Association of General Railway Baggage Agents; by the National Funeral Directors' association, and by several State Boards of Health, were adopted by the Iowa Board. It is a radical departure from our present rules. It is evident that these cannot go into practical operation as yet, since no practical details as to the licensing of undertakers have been adopted by the Board, and the Secretary has no authority to issue such license, nor to recognize in any way any undertaker. They are published, however, as the public expression of the Board, and are in the interest of safety and uniformity, and so soon as details can be arranged they will be officially declared as in operation. In the meantime the rules heretofore in force will be strictly observed:

RULE 1. The transportation of bodies dead of smallpox, Asiatic cholera, yellow fever, typhus fever or bubonic plague is absolutely forbidden.

RULE 2. The bodies of those who have died of diphtheria (membranous croup), scarlet fever (scarlatina, scarlet rash) glanders, anthrax or leprosy, shall not be accepted for transportation unless prepared for shipment by being thoroughly disinfected by arterial and cavity injection with a proved disinfectant fluid, (b) disinfecting and stopping of all orifices with absorbent cotton, and (c) washing the body with disinfectant, all of which must be done by an embalmer holding a certificate as such approved by the State Board of Health. After being disinfected as above, such body shall be enveloped in a layer of cotton not less than one inch thick, completely wrapped in a sheet and bandaged, and encased in an air-tight zinc, tin, copper, or lead lined coffin, or iron casket, all joints and seams hermetically soldered, and all enclosed in a strong, tight wooden box. Or, the body being prepared for shipment by disinfecting and wrapping as above, may be placed in a strong coffin or casket, and said coffin or casket encased in an

air-tight zinc, copper or tin case, all joints and seams hermetically soldered, and all enclosed in a strong outside wooden box.

RULE 3. The bodies of those dead from typhoid fever, puerperal fever, erysipelas, tuberculosis, measles, or other dangerous communicable diseases, other than those specified in rules 1 and 2, may be received for transportation when prepared for shipment by filling cavities with an approved disinfectant, washing the exterior of the body with the same, stopping all orifices with absorbent cotton and enveloping the entire body with a layer of cotton not less than one inch thick, and all wrapped in a sheet and bandaged and encased in an air-tight coffin or casket, provided that this shall apply only to bodies that can reach their destination within forty-eight hours from the time of death. In all other cases such bodies shall be prepared for transportation in conformity with rule 2. But when the body has been prepared for shipment by being thoroughly disinfected by an embalmer holding a certificate as in rule 2, issued by the State health authorities, the air-tight sealing may be dispensed with.

RULE 4. The bodies of those dead from diseases that are not contagious, infectious or communicable may be received for transportation when incased in a sound coffin or casket and enclosed in a strong outside wooden box, provided they reach their destination within thirty hours from time of death. If the body cannot reach its destination within thirty hours from time of death it must be prepared for shipment by filling the cavities with an approved disinfectant, washing the exterior of the body with the same, stopping all orifices with absorbent cotton and enveloping the entire body with a layer of cotton not less than one inch thick, and all wrapped in a bandage and encased in an air-tight coffin or casket. But when the body has been prepared for shipment by being thoroughly disinfected by an embalmer holding a certificate as in rule 2, issued by the State health authorities, the air-tight sealing may be dispensed with.

RULE 5. In cases of contagious, infectious or communicable diseases the body must not be accompanied by persons or articles which have been exposed to the infection of the deceased, unless certified by the health officer as having been properly disinfected; and before selling passage tickets agents shall carefully examine the transit permit and note the name of the passenger in charge, and of any others proposing to accompany the body, and see that all necessary precautions have been taken to prevent the spread of the disease. The transit permit in such cases shall specifically state who is authorized by the health authorities to accompany the remains. In all cases where bodies are forwarded under rule 2 notice must be sent by telegraph to the health officer at destination, advising the date and train on which the body may be expected. This notice must be sent by or in the name of the officer at the initial point, and to enable the health officer at destination to take all necessary precautions at that point.

RULE 6. Every dead body must be accompanied by a person in charge, who must be provided with a passage ticket and also present a full first-class ticket marked "corpse" for the transportation of the body, and a transit permit showing the physician's or coroner's certificate, name of deceased, date and hour of death, age, place of death, cause of death, and, if of a contagious, infectious or communicable nature,

the point to which the body is to be shipped, and when death is caused by any of the diseases specified in rule No. 2, the name of those authorized by the health authorities to accompany the body. The transit permit must be made in duplicate, and the signatures of the physician or coroner, health officer and undertaker must be on the original and duplicate copies. The undertaker's certificate and paster of the original shall be detached from the transit permit and pasted on the coffin box. The physician's certificate and transit permit shall be handed to the passenger. The whole duplicate copy shall be sent to the official in charge of the baggage department of the initial line, and by him to the Secretary of the State, or Provincial Board of Health of the State or Province from which said shipment was made.

RULE 7. When the dead bodies are shipped by express the whole original transit permit shall be placed upon the outside of the box and the duplicate forwarded by the express agent to the express agent and Secretary of the State or Provincial Board of Health of the State or Province from which said shipment was made.

RULE 8. Every disinterred body dead from any disease or cause shall be treated as infectious or dangerous to the public health, and must not be accepted for transportation unless said removal has been approved by the State or Provincial Health Authorities having jurisdiction where such body is to be disinterred, and the consent of the health authorities of the locality to which the body is consigned has first been obtained; and all such disinterred remains must be enclosed in a hermetically sealed (soldered) zinc, tin, or copper-lined coffin or box.

Bodies deposited in receiving vaults will be treated and considered the same as buried bodies.*

Dr. R. E. Conniff, who represented the Iowa State Board of Health in the late meeting of the American Public Health Association, made the following report:

I have the honor to report to you the proceedings of the American Public Health Association, at its twenty-fifth annual meeting in Philadelphia, Pa., which occurred October 26th-29th inclusive. I wish in this connection to thank you most heartily for the honor you so kindly conferred upon me in electing me to represent you in that meeting, made up of the most scientific, able and thoughtful men of our profession in the United States, Canada and Mexico.

The Association was well attended, there being about three hundred delegates and members present, mostly from the United States. Canada and Mexico sent some very able men, who entered into the work of the Association most heartily.

The meetings were held in Banquet Hall of Hotel Walton.

The first session was called to order promptly at 10 A. M., October 26th, by the President, Dr. Henry B. Horlbeck, Charleston, S. C. After the preliminary opening exercises, Dr. Frederick Montizambert, general superintendent of quarantine of the Dominion of Canada, presented a brief but interesting report upon "steamship and steamboat sanitation." The report recommended a more careful regulation in regard to food, disinfection

* This regulation relative to vaults was subsequently rescinded—*Secretary.*

tion of bedding and the enforcement of the strongest rules regarding the commingling of passengers, thus conducing the spread of contagion.

The next paper read was a learned and carefully prepared contribution to the study of yellow fever, by Dr. Eduardo Liceaga, and Dr. Jose Ramirez, the president and secretary respectively of the Supreme Board of Health of Mexico. The eminent gentlemen dealt with the medico-geographical phase of the subject, emphasizing the necessity of distinguishing this condition from the paludal or malarial fevers so prevalent in Mexico and the southern states. They called attention to the reduction in the death rate in Mexico, and the successful work of the Supreme Board of Health. They reported that Mexico, at this time, was practically free from yellow fever and caused some of us to blush to learn that Mexico finds it necessary, for her own protection, to institute a quarantine against the United States because of our lax quarantine regulations. This paper was ably discussed by Drs. Bailey, Durgin and others. Dr. Bailey very interestingly detailed the occurrence of a case of yellow fever the present summer at Louisville, Ky. The patient was an importation from a Mississippi town, Ocean Springs, I think. The case was diagnosed yellow fever at Louisville, and the authorities of the locality from which the patient came were notified of the nature of the disease. An investigation was had by the Mississippi authorities, and the Louisville Board of Health was given to understand that the case was one of malarial fever, although some dozens were sick of the same disease. A careful autopsy demonstrated the true nature of the disease, which was finally but reluctantly consented to by the authorities at the distributing point, and measures were taken to limit its spread, after an incalculable amount of harm had been done and a number of lives lost, through the carelessness or incompetency of the authorities. This sad circumstance emphasizes the responsibility resting upon all of us as officials or as individuals, and reminds us that it is our duty to be alert and painstaking in all matters pertaining to the public health.

The report of the Committee on Sanitation with special reference to the drainage, plumbing and ventilation of the public and private buildings was next taken up. The discussion on this paper was quite animated, some of the members contending that the carbonic acid gas in the exhaled air is not injurious to breathe, while others held firmly to the commonly accepted view that it is injurious to animal life.

The report on "car sanitation" was presented by Prof. S. H. Woodbridge, of the Institute of Technology, Boston, Mass. The new sanitary sleeper, "The Osgood," was described at length. While this report was long and learned, advocating compulsory ventilation and systematic disinfection, the author offered no practical suggestion, nor remedy. The report in no way compared with the up-to-date practical presentation of the subject by one of our own members at a recent meeting of the Board. And this reminds me that in all matters involving the public health, the State Board of Health of Iowa takes rank with that of any other state of the Union, and in some particulars it is occupying advanced ground. Only in one particular does any other state exceed us—in the matter of original bacterial investigation, in which I hope we will be able to do more in the future than we have in the past. I have come back thoroughly convinced that no more able, thoughtful, and progressive body of men have supervision

of the public health of any state in the Union, and I take pride in being able to make this statement.

Next in order came some interesting reports on the serum diagnosis of typhoid fever, with particular reference to the Widal blood reaction.

In the evening came the address of welcome by the Hon. Charles F. Warwick, mayor of Philadelphia, and an able and carefully prepared address by the President of the Association. The particular feature of this address was a careful survey of the yellow fever situation, with a recommendation that a committee be appointed to wait on President McKinley, urging him to recommend to congress the appointment of a commission to investigate the cause and nature of yellow fever, with a view of better restricting its spread in our country.

When we recall what has been done in other countries for humanity by like commissions this seems like a wise recommendation, and I would suggest that a committee of this Board be appointed to draft resolutions to be forwarded to the President—thus putting ourselves on record as favoring the appointment of such a commission.

The Committee on the Pollution of Water Supplies reported through its Chairman, Dr. Charles Smart, Surgeon U. S. Army. The report was followed by other papers dealing with the subject in a scientific and practical way, embodying many suggestions which the length of this report will not permit me even to mention.

A report on "Disinfectants," embodying valuable information, carefully compiled and cleverly presented, was read by Prof. F. C. Robinson, of Bowdoin College, Maine, which elicited more discussion than any other subject brought before the Association. A wide difference of opinion was expressed regarding the disinfecting properties of formaldehyde. The results of thorough tests, as reported, widely differed. The experience of the year would seem to teach that formaldehyde is not the ideal disinfectant, but has a place at or near the head of this class. The workings of the various lamps and generators were all found to be faulty, by careful and painstaking observers. From all this it would seem we are not yet ready to discard the former methods of disinfection and fumigation for this, as yet, uncertain agent.

The barber shop as a menace to public health was carefully set forth in a paper by Dr. A. W. Suiter, of Herkimer, N. Y. The paper was interesting, describing the Paris regulations of barber shops at length, and was full of suggestions which seem to the writer of little practical importance, although the subject is one demanding attention at the hands of physicians and health boards.

Mrs. John H. Scribner, President of the Woman's Health Protective Association of Philadelphia, read a very interesting paper outlining the methods employed by this Association in bringing about a better sanitary condition of the city. Such organizations are great educators and valuable aids to local and State Boards of Health. I wish we had such an organization in every town and city in our State; then the labors of this Board would be appreciated and its rules rigidly enforced.

Vaccine farms and the preparation of virus was ably presented by Dr. Pittfield. It was advocated that each vaccine station be under the supervision of the respective State Boards of Health, and that they be regularly

and carefully inspected—some of the virus in the market being positively dangerous.

The Surgeon-General of the United States Army, Dr. George M. Sternberg, stated at length his experiments and investigations in yellow fever on the island of Cuba in 1879 and 1888, and was of the opinion that the bacillus he then isolated and named the *Bacillus X*, is identical with the *Sanarelli bacillus*. He is still making extensive experiments and hopes to demonstrate the truth of his claims.

Five papers were presented upon various phases of tuberculosis—all carefully prepared and teeming with interest. There was nothing, however, brought forward which has not been carefully considered by this Board. The work done in Iowa in the investigation of bovine tuberculosis is, in my opinion, as scientific, practical and up to date, as like work in any part of the United States. Considering our meagre appropriation for the prosecution of such work, this is a matter of self congratulation.

An interesting consideration of the water supplies, and of garbage and sewage disposal was entered upon. Col. George E. Waring, Civil Engineer of New York City, gave some practical hints and valuable suggestions. These papers were discussed at length and elicited general interest. The Association was divided in opinion as to the best method of garbage disposal, some favoring entire cremation, others the reduction method. The latter was reported as being employed, in part, in Philadelphia, and was found quite satisfactory.

The report of the Committee on the "Transportation and Disposal of the Dead" was presented. After extensive discussion the report was adopted with a few changes. The report did not, in the opinion of your representative, fully cover the ground, and could not be adopted by this Board in its present form, although satisfactory to the General Baggage Agents, and to the National Association of Funeral Directors.

There were other interesting and valuable papers read and carefully discussed which I cannot mention here. The meeting was full of interest from beginning to end, and gave a new impetus to the importance and best methods of sanitary work in every part of the vast territory represented.

The good people of Philadelphia excelled themselves in hospitalities to the delegates and their wives—having lost none of those generous qualities that have justly entitled it to the name of the "City of Brotherly Love."

Relative to the outbreak of diphtheria at Blockton, Dr. E. A. Guilbert offered the following resolution, which was unanimously adopted:

"In the matter of the episode which has recently occurred at Blockton, this Board emphatically expresses itself as being more than ever impressed with the value and pertinency with regard to quarantine in infectious diseases. We find, from the evidence submitted, that grave violations of the health laws of the State have been perpetrated, not only on the part of the local board but also on the part of a certain medical man of Blockton. We further state that should the lessons thus taught be not hereafter heeded by all concerned this Board will deem it to be its duty to enforce immediate salutary discipline. As the conservators of the public health we positively condemn the attempt on the part of any medical

man to cover and conceal the true character of an infectious disease for the purpose of shielding a personal friend.”.

Doctor Carter reported a visit to Montezuma on account of an outbreak of diphtheria and some dispute as to the character of the disease. He reported that he had seen twelve or thirteen cases that were or had been diphtheria, and that he recommended quarantine in all the cases.

On motion it was directed that an official circular be prepared and printed and sent by the Secretary to each County Auditor, directing him that inasmuch as the County Clerks already have data respecting births and deaths for 1897, to include September 30th, the assessors be instructed to secure statistics for the remaining months of the year, namely, October, November and December.

[NOTE.—Immediately upon the adjournment of the Board, in accordance with the above directions the following circular letter was issued:

STATE OF IOWA,
OFFICE OF THE STATE BOARD OF HEALTH, }
DES MOINES.

To County Auditors:

The new code, chapter 16, title 12, has provided new methods for securing vital statistics of the State, by which they are to be gathered by assessors at the time of making the annual assessments. The statute fixes the statistical year as ending on the 31st of December, and under this provision the assessors would be required to ascertain and report to your office all births and deaths occurring within their districts during the year from January 1, 1897, to January 1, 1898.

Inasmuch as under the old law these statistics have been reported to the clerk of the courts, and to this office for the year ending October 1, 1897, and to avoid repetition and confusion of records, it is recommended by the State Board of Health that assessors be specially instructed by county auditors to confine their reports to the months of October, November and December, 1897, and thus make the reports coincident with the statistical year, as fixed by the code.

By order of the Board.

J. F. KENNEDY,
Secretary.]

J. M. EMMERT,
President.

The Committee on Communications, Dr. E. A. Gilbert, reported upon the questions submitted.

Mr. J. F. Horne, of Clarinda, states that the cemetery authorities, in making an addition to the Clarinda cemetery, were approaching his residence and water supply so closely as to produce alarm and great anxiety for the health of his family and asking this Board to advise him what to do. The committee reported as follows: “The communication of Mr. J. F. Horne, of Clarinda, presents a matter calling for prompt action on the part

of the Board. Taking his statement as fact, his contention is just. There is no question in the mind of the writer that the nearness of Horne's residence to the newly developed burial ground and the relation of his well to the slope of the intervening space are such as to menace, in the near future, the purity of the drinking water used by his own family and the families of neighbors. Your committee recommend that our Secretary be, and hereby is, instructed promptly to address the local board of Clarinda, apprising them of our conclusions and directing that board to consider the propriety of causing the new cemetery to be removed and further burials there prohibited."

The recommendation was adopted.

Relative to the communication of Dr. N. R. Hook, of Oskaloosa, the committee reported:

This communication is accompanied by certain newspaper clippings. It seems that an epidemic of sore throat has struck Oskaloosa. As usual, the flood-gates of medical debate have been opened and spirited discussions as to the relation of the ailment to diphtheria have occurred, and have got into the papers. One medical man is quoted by the *Oskaloosa Herald* as saying that no diphtheria exists in the city, and further, that membranous croup and diphtheria are not identical. Inspired, doubtless, by the medical man aforesaid, the *Herald* remarks: "The doctor has had several spirited controversies on this point *and has always been sustained by the State Board of Health.*" It is proper to say, for the *Herald's* information, that this statement masquerades the truth. The State Board has never made the statement in support of any medical controversialist, or any other person whatsoever, that membranous croup and diphtheria were not identical. On the contrary, it is on record in its published rules relating to quarantine positively to the effect that they are identical.

As to the policy of closing the schools during this epidemic, it would seem to this Board that if the suspected cases have been rigidly quarantined, such closure would be unnecessary. However, that is a matter clearly within the province of the local board, which seems to be alive to its duty.

This item of the report was adopted.

FINANCIAL.

The Secretary submitted the following report for the quarter ending October 31, 1897:

Board meeting August 5, 1897.

MEMBERS' EXPENSE ACCOUNT.

J. M. Emmert.....	\$ 18.00
E. A. Guilbert.....	30.00
J. A. Scroggs.....	25.00
R. E. Conniff.....	30.00
W. Bancroft.....	26.20
E. H. Carter.....	6.00

J. C. Shrader.....	\$ 22.50
J. I. Gibson.....	24.00
Warren Dickinson.....	6.00
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Total.....	\$ 187.70

Paid by state warrant No. 16213.

CURRENT EXPENSES FOR AUGUST.

J. F. Kennedy, Secretary	\$ 100.00
L. F. Andrews, Clerk.....	75.00
J. C. Shrader, attending Nashville meeting.....	56.65
E. A. Guilbert, attending Nashville meeting.....	56.15
Des Moines Book and Stationery company—	
2 dozen Manilla pads.....	\$ 1.20
2 quarts mucilage.....	1.50
1 ream T. W. paper.....	1.75
2 dozen pads.....	1.35
1 Bot. ink eradicater.....	.25
2 gross pens.....	1.80
5 Copying leads.....	.25
<hr/>	
	8.10
Gertrude Kennedy, mailing <i>Bulletin</i>	4.00
American Express company.....	2.45
United States Express company.....	2.00
Postal guide.....	2.00
Adams Express company.....	.30
Western Union Telegraph company.....	.25
Carter & Hussey—	
1,000 envelopes.....	\$.75
1,500 marriage blanks.....	22.55
500 birth blanks.....	8.25
<hr/>	
	31.55
George A. Miller Printing company, <i>Bulletins</i>	36.00
Iowa Printing company—	
500 envelopes.....	\$ 1.25
500 letter heads.....	5.00
<hr/>	
	6.25
<hr/>	
	\$ 380.70

Paid by State warrant No. 16332.

CURRENT EXPENSES FOR SEPTEMBER.

J. F. Kennedy, Secretary	\$ 100.00
Cheese cloth, (duster)20
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	\$ 100.20
L. F. Andrews, Clerk.....	75.00
George A. Miller Printing company, <i>Bulletins</i>	36.00
Langan Bros., 5,000 envelopes.....	21.25
Carter & Hussey—	
800 envelopes.....	\$ 1.00
20,000 wrappers.....	14.00
<hr/>	
	15.00

FINANCIAL STATEMENT.

27

Gertrude Kennedy, mailing <i>Bulletin</i>	4.00
Adams Express company.....	3.90
M. Joyce Engraving company.....	3.40
Des Moines Book and Stationery company—	
1 ream legal cap.....	\$ 2.75
1 quart ink.....	.85
1 quart mucilage.....	.75
	<hr/> 3.35
American Express company.....	1.73
<i>American Veterinary Review</i>	3.00
Norman Lichty, feather duster.....	.95
Wells Fargo & Co Express.....	.55
	<hr/>
Total	\$ 268.33
Paid by State warrant No. 16880.	

CURRENT EXPENSES FOR OCTOBER.

J. F. Kennedy, Secretary.....	\$ 100.00
L. F. Andrews, Clerk.....	75.00
Carter & Hussey—	
1,000 envelopes.....	\$ 1.00
1,200 form 1 C.....	8.75
2 dozen legal pads.....	1.70
1,200 form 8 D.....	5.25
300 form 3 C.....	2.00
1,000 form 24 E.....	3.25
300 form 16 C.....	3.00
300 form 10 C.....	3.00
1,000 form 10 A.....	1.00
100 form 23 C.....	2.75
	<hr/> \$ 31.70
George A. Miller Printing company, <i>Bulletin</i>	36.00
E. H. Hunter, postage.....	25.00
Star Engraving company—	
1 half-tone.....	\$ 3.00
1 engraving.....	7.50
	<hr/> 10.50
R. N. Dahlberg—	
Repairing typewriter.....	\$ 5.00
Cylinder.....	1.20
	<hr/> 6.20
<i>American Veterinary Review</i>	6.00
Gertrude Kennedy, mailing <i>Bulletin</i>	4.00
American Express company.....	2.84
<i>Journal and Microscope</i>	2.50
Western Union Telegraph company.....	1.51
Des Moines Book and Stationery company (book).....	1.40
Adams Express company.....	1.35
Langan Bros., twine.....	1.17
Elmer & Amend, cylinders.....	.70

Telephone .....	.50
Total	\$ 206 37
Paid by State warrant No. 17250.	

RECAPITULATION.

Board meeting	\$ 187.70
August expenses	380 70
September expenses	268.33
October expenses	206.37
Total	\$ 1,043.10

The report was received by the Board and referred to the auditing committee, who reported that they had carefully examined the financial report the Secretary had presented and found it correct. The report of the committee was adopted.

The Committee on Revision of Circulars reported progress, and were continued until the next meeting.

On motion Board adjourned to meet at call of President.

JANUARY MEETING, 1898.

The Board was called to order at 10 A. M. The President, Dr. J. M. Emmert, having resigned because of his election as State Senator, Dr. Carter was elected President *pro tem*.

There were present Drs. Carter, Bancroft, Guilbert, Scroggs, Conniff, Gibson, and Mr. Warren Dickinson, C. E.

Dr. James Irvine Gibson, State Veterinary surgeon, was unanimously elected President of the Board for Dr. Emmert's unexpired term.

The minutes of the last meeting were read and approved.

Dr. J. A. McKlveen, of Chariton, appointed to succeed Dr. Carter January 31st, being present, was introduced. Dr. Emmert, late President, also called in, and both were extended the courtesies of the floor.

Dr. Emmert, upon invitation, made an interesting report of an outbreak of diphtheria at Audubon, whither he had been called to assist in establishing quarantine. There had been in all about twenty-four cases. The first four or five cases occurred almost simultaneously among persons engaged in picking chickens in a poultry slaughter house.

Some Christian Scientists, or one woman in particular, gave the authorities a great deal of trouble until very drastic meas-

ures were applied. A police quarantine was required.

On motion, Doctor Emmert was thanked for his report and his course in establishing a "shotgun" quarantine was approved.

Board adjourned until 2 P. M.

Board reconvened, as per adjournment, at 2 P. M., and was called to order by President Gibson. There were present, Doctors Gibson, Guilbert, Bancroft, Scroggs, Conniff, Carter and Warren Dickinson.

The quarterly report of the Secretary was read, received and considered *seriatim*.

Dr. W. D. Middleton, of Davenport, Surgeon-in-Chief, Chicago, Rock Island & Pacific railroad, submitted a question as to whether the remains of a person dying in New York, of diphtheria, could be shipped to Muscatine, Iowa. The Secretary was instructed to reply that if the remains were so prepared and disinfected as to permit their shipment through New York and the intervening States, that so far as Iowa was concerned there could be no objection to their coming into the State, at the point named, provided they were shipped in a metallic casket and the casket hermetically sealed, and not opened at the point of destination.

OIL DISTRICTS.

The recommendation of the Secretary, for the division of the State into fourteen oil inspection districts and the adoption of metes and bounds for these districts, was laid over until the Governor could be consulted as to his wishes in the matter.

On motion, the Board adjourned.

JANUARY 19TH.—Board reconvened at 10 A. M.; President Gibson in the chair. There were present, Doctors Gibson, Guilbert, Bancroft, Carter, Conniff, Scroggs and Mr. Dickinson.

MINERS' OIL.

The question of changing the specific gravity standard of miners' oil from twenty-four to twenty-two degrees, as recommended by the Secretary, was taken up and the matter was referred to Professor Macy, Chemist of the Board, Mr. Dickinson, Civil Engineer, and Dr. Eli Grimes, Bacteriologist of the Board. Later, Professor Macy, for the committee, reported in favor of the change inasmuch as twenty-two degrees more nearly represented the true specific gravity of winter-strained

cottonseed oil. He said this specific gravity would, however, be as easily imitated by adulterants as the former standard (twenty-four degrees) but the physical appearances would more readily lead to detection, without chemical analysis.

TUBERCULOSIS AMONG CATTLE.

Dr. Gibson presented the following resolution, which was adopted:

WHEREAS, We learn that a bill is pending before the legislature of this State now in session, which is for the protection of the public health and the animal industry of the State, known as Senate file No. 3, be it

Resolved, That we, the members of the State Board of Health, do most heartily endorse said bill, and request the present legislature to enact said bill, which will protect our cattle from exposure to tuberculous cattle that are being shipped into our State from other states, where cattle are being tested for tuberculosis, apparently to avoid the test, and very materially lessen the number of exposures of our people to tuberculosis.

"CONTAGIOUS DISEASES AMONG DOMESTIC ANIMALS."

Dr. Gibson, Chairman of the Committee on "Diseases of Animals, and Veterinary Sanitation," presented the revised pamphlet on "Contagious Diseases Among Domestic Animals," and rules for their prevention, which was, upon examination, adopted as revised, and the Secretary was directed to have printed for distribution an edition of 2,000 copies.

On motion, the Board adjourned.

Board reconvened at 2:20 P. M., Dr. Gibson in the chair. There were present, Drs. Guilbert, Gibson, Bancroft, Carter, Conniff and Dickinson.

RULES AND REGULATIONS FOR TOWNSHIP BOARDS.

The circular, "Form 28 B," containing rules and regulations for township boards of health, and recommended by the State Board for adoption by them, was revised and the Secretary was directed to have 2,000 copies printed for distribution.

Board adjourned until to-morrow.

JANUARY 20TH.—Board reconvened at 10 A. M., and was called to order by the President, Dr. Gibson.

There were present, Drs. Gibson, Carter, Bancroft, Scroggs and Guilbert, and Mr. Warren Dickinson.

SPECIAL DISINTERMENT PERMITS.

Special disinterment permits were issued upon the following specified conditions:

1. That the disinterment is for the purpose of reinterment in another part of the same cemetery, or in a cemetery nearly contiguous.
2. That the removal shall not be by any public conveyance.
3. That the removal shall be done at an hour when there is the least possible exposure of other persons.
4. That no children shall be present, and only such persons as are actually necessary.
5. That the coffin shall not be opened.
6. That the sexton and all other persons engaged in such removal shall immediately thereafter change their clothing and properly disinfect or burn the same, and shall thoroughly disinfect their hands, head and face.
7. That this permit shall be approved by the local board of health of the city, town, or township of the locality where the remains are interred.

[These special permits are granted principally in cases of diphtheria and scarlet fever. Under no circumstances are permits granted for the disinterment or transportation of bodies dead of smallpox, Asiatic cholera, yellow fever, typhus fever, or bubonic plague.—SECRETARY.]

The remainder of the day was spent in further consideration and revision of the official circulars of the Board.

Board adjourned to meet at 10 A. M. to-morrow.

JANUARY 21ST.—Board reconvened as per adjournment at 10 A. M., with Dr. Gibson in the chair. There were present, Remley, Guilbert, Bancroft, Dickinson, Carter and Gibson.

COMMUNICATIONS.

Dr. Guilbert, Committee on Communications, reported on certain communications referred to him: Approving the action of Farragut board of health in quarantining against Riverton because the latter had failed to do its duty; declaring that the poultry shambles of Wapello, as reported, was a slaughterhouse in the dirtiest sense of the word, and needed the considerate attention of the local board; and suggesting that the Iowa State Board of Health should be represented at the annual meeting of the "Conference of State and Provincial Boards of Health," to be held at Detroit, Mich., in honor of the quarter centennial of the organization of the Michigan State Board of Health.

The report was received and adopted.

TYPEWRITING MACHINE.

The Secretary was authorized to purchase for the use of the office a new typewriting machine at a cost not to exceed \$75.

SECRETARY STATE BOARD MEDICAL EXAMINERS.

Doctor Guilbert presented a memorial addressed to the General Assembly, now in session, petitioning that the statute relating to the State Board of Medical Examiners be so amended as to allow the Secretary of said Board a compensation for his services, as such, not to exceed \$800 per annum, and the Secretary was instructed to prepare a bill in accordance therewith and have it introduced.

The memorial was unanimously adopted and the Secretary was so instructed.

FINANCIAL.

The Secretary presented his financial report for the quarter ending December 31, 1897, which was referred to the Auditing Committee who reported as follows:

Your Committee, to whom was referred the Secretary's financial report for the quarter ending December 31, 1897, report that they found proper vouchers filed for each and every item, and that warrants drawn check with registered bills for the quarter.

(Signed)

WARREN DICKINSON,
J. I. GIBSON.

The report of the committee was received and adopted.
The financial statement of the Secretary was as follows:

Board meeting—September 30th.

MEMBERS' EXPENSE ACCOUNT.

J. M. Emmert.....	\$ 16.00
J. C. Shrader.....	21.01
E. A. Guilbert.....	25.90
E. H. Carter.....	6.00
J. A. Scroggs.....	28.10
W. Bancroft	25.00
J. I. Gibson.....	25.00
Total	\$ 147.01

Paid by State warrant No. 17091.

SPECIAL.

November 2d:

J. F. Kennedy, expenses attending meeting of American Public Health Association, Philadelphia..... \$ 68.00
Paid by State warrant No. 17449.

November 9th:

R. E Conniff, expense attending meeting of American Public
Health Association, Philadelphia..... \$ 85.66

Paid by State warrant No. 17503.

Board meeting November 10, 1897.

MEMBERS' EXPENSE ACCOUNT.

R. E. Conniff	\$ 34.10
J. I. Gibson	28.08
W. Bancroft	28.06
J. M. Emmert	15.00
E. A. Guilbert	29.90
E. H. Carter	6.50
Total	\$ 141.64

Paid by State warrant No. 17522.

November 30th:

J. F. Kennedy, salary for month..... 100 00

Paid by State warrant No. 17735.

CURRENT EXPENSES FOR NOVEMBER.

L. F. Andrews, salary and notarial commission.....	\$ 80.00
George A. Miller Printing company, 6,000 <i>Bulletins</i>	36.00
Langan Bros—	
1 bdl. 24x36 in. Manilla.	
½ ream 40x48 in. Manilla.....	9.14
Lea Bros. & Co., Amer. Syst. Pract. Med. (sheep).....	6 00
Gertrude Kennedy, two days mailing <i>Bulletin</i>	4.00
Journal Comp. Med. and Vet. Archives, 1898.....	3.25
United States Express company.....	2.03
Des Moines Book and Stationery company—	
1 gross rubber bands.....	\$.35
1 gross rubber bands.....	.50
1 quart Carter's ink.....	.80
	1.70
American Express company.....	1.32
Adams Express company.....	1.10
Western Union Telegraph company.....	1.01
Babyhood Publishing company (subscription).....	1.00
C. W. Rogg, 4 brushes.....	.75
Norman Lichty, 1 quart ammonia.....	.40
Des Moines Rubber Stamp company .....	.15
Total	\$ 17.88

Paid by State warrant No. 17734.

December 30th:

J. F. Kennedy, salary for month 100.00

Paid by State warrant No. 18159.

CURRENT EXPENSES FOR DECEMBER.

L. F. Andrews, salary.....	\$ 75.00	
Munn & Co., <i>Scientific American</i> (1898).....	5.00	
D. Appleton & Co., <i>Popular Science Monthly</i> (1898).....	5.00	
Conf. State and Prov. Boards of Health.....	5.00	
American Express company.....	4.70	
Gertrude Kennedy, two days mailing <i>Bulletin</i>	4.00	
Western Union Telegraph company.....	2.93	
Des Moines Book and Stationery company—		
1 volume Thresh's Water supply.....	\$ 1.40	
2 steel erasers .....	.75	
	<hr/>	2.15
<i>Popular Science News</i>	2.00	
<i>Edward's Journal of Health</i>	2.00	
Capital City Gas Light company—		
2 mantles at 50 cents each.....	\$ 1.00	
2 mica chimneys at 35 cents each.....	.70	
	<hr/>	\$ 1.70
Postal Telegraph-Cable company.....		1.28
Adams Express company.....		1.05
Langan Bros, 2 dusters at 30 cents each.....		.60
<i>Iowa State Register</i> , 8 copies, November 16.....		.24
George A. Miller Printing company, 6,000 <i>Bulletins</i>		36.00
	<hr/>	
Total	\$	148.62

Paid by State warrant No. 18160.

RECAPITULATION.

Board meeting September 30th.....	\$ 147.01
Board meeting November 10th.....	141.64
November expenses.....	401.54
December expenses.....	248.62
	<hr/>
Total	\$ 938.81

On motion, Board adjourned to meet at the call of the President.

MARCH MEETING, 1898, (SPECIAL).

Upon the call of the President, Dr. J. I. Gibson, of Denison, the State Board of Health met in special session March 24th, and was called to order by the President.

There were present, Doctors Gibson, Guilbert, Bancroft, Scroggs, Warren Dickinson, Sanitary Engineer; Hon. Milton Remley, Attorney-General; and Dr. Matthey. The last named has been appointed by Governor Shaw to the vacancy made by the resignation of Doctor Emmert.

The reading of the minutes and of the Secretary's report was dispensed with, as the object of the special meeting was the revision of the circulars and rules and regulations of the Board.

"Form 115 B," a form of an "ordinance for the protection of the public health; recommended by the State Board of Health for adoption by the cities and towns of the State of Iowa," was duly considered, revised and an edition of 2,000 copies ordered printed.

Several applications for special disinterment permits were made and allowed under certain specified conditions.

Dr. J. A. McKlveen was present for the first time, having been appointed to the vacancy occasioned by the retirement of Dr. E. H. Carter, whose time expired January 31st, last.

Form 70B, was taken up by the Board, revised and 2,000 copies ordered printed. This is the circular of the Board on the "restriction and prevention of contagious diseases in the public schools."

Form 90B, "regulations for the use of kerosene and gasoline (petroleum products)," was duly considered, revised and 2,000 copies ordered printed.

Form 130B, relating to "quarantine," and form 128B, relating to "disinfection," were revised, consolidated and 2,000 copies ordered printed as "form 130B, regulations for the quarantine and disinfection of contagious diseases."

Form 90B, "regulations for local boards of health in the State of Iowa" was also revised, and 2,000 copies ordered printed.

LEPROSY.

Dr. Guilbert introduced the following resolution, which was adopted:

Resolved, That it is the sense of this Board that while we recognize the fact that the contagiousness of leprosy is an unsettled question, it is in our opinion best for the public health, that persons afflicted with well developed leprosy should be required by all local health boards to remain on their own premises, instead of being permitted to mingle with the general public.

The Board adjourned to meet in regular session May 11th prox.

MAY MEETING—1898.

The Iowa State Board of Health convened in annual session in the capitol, May 11, 1898, and was called to order by President Gibson.

There were present Drs. Gibson, Guilbert, Shrader, Bancroft, Conniff, Scroggs, Matthey, McKlveen and Mr. Dickinson, C. E.

The minutes of the last regular and intervening meetings were read and approved, and the report of the Secretary was read and considered *seriatim*.

Dr. Guilbert offered the following resolution, which was adopted:

Resolved, Inasmuch as a necessity seems to have arisen at Camp McKinley for the use of disinfectants, that our Bacteriologist, Dr. Eli Grimes, be, and hereby is, empowered by this Board, to tender his services on our behalf to the medical authorities of the camp, and the Des Moines Board of Health.

GLANDERS.

Dr. Gibson, Chairman of the Committee on Diseases of Animals, reported some additional cases of glanders on a farm in Sioux county. It may be remembered that in the July, 1897, issue of the *Bulletin*, we referred to a case of glanders in a child three years of age, that was reported by Dr. Fred J. Smith, of Alton. A visit to the place where the case was reported was made by Dr. Gibson, who found, upon arrival, that the child had died. From the description of the case as given by Dr. Smith, Dr. Gibson was led to believe the diagnosis given by Dr. Smith was correct. The cases seen by Dr. Gibson, as above reported in Sioux county, were upon the same farm, and it was found that since Dr. Gibson had visited the place before to see Dr.

Smith's case, two horses had died of glanders—affording a striking confirmation of the diagnosis made by Dr. Smith, and illustrating the highly infectious character of the disease—a disease alike dangerous and fatal to animals and to the human family.

CORPSES.

The Board took action relative to the transportation of bodies dead from certain infectious diseases; and in order to admit of the transportation by public conveyance of bodies dead from diphtheria, scarlet fever, glanders, anthrax, and leprosy, whose transportation has heretofore been prohibited, adopted certain rules by which funeral directors, who by examination before the Board of Health as to their competency as skilled embalmers, may be licensed to prepare and ship such bodies.

These rules were published in full in the last (May) issue of the *Bulletin*, and can be had in pamphlet form upon application to this office.

DISINTERMENTS.

A special permit was granted to disinter the body of Maggie E. Welch, who died of diphtheria, from one lot in the Cedar Rapids cemetery to another lot in the same cemetery.

Applications for the disinterment of Emma Dorman, August Dorman and Henry Dorman, all dying of diphtheria, and their removal by private conveyance from the German Reformed cemetery in Mahaska township, to the Newton cemetery, was laid over for further information as to distance, etc.

The application to disinter and remove, by railway, the body of Ruth Gilbreath, dying of scarlet fever, from Rochester cemetery, in Cedar county, to Columbus Junction, in Louisa county was refused.

The Secretary was directed to respectfully inform Doctor Gilman, Superintendent of the Hospital for the Insane at Mount Pleasant, who had applied for a number of disinterment blanks duly signed by the Secretary, to be used by him as occasion required, that the Board would not be justified in permitting the Secretary to sign any such blanks in advance of an application in each case setting forth the data relative to cause of death, etc.

In regard to the special disinterment permit granted at the last meeting of the Board to remove a body, dead from scarlet fever, by private conveyance, from Riverton cemetery to the Sidney cemetery, a distance of nine miles, and through two townships, the Board declared that the consent of the townships through which the remains were to be carried, as well as that of Sidney cemetery, where the body was to be reinterred, should be obtained.

MINERS' OIL.

Professor Macy, Chemist of the Board, as Chairman of the Special Committee on Miners' Oil, presented the following rules to be observed by the District Oil Inspectors in testing the oil to be used by coal miners, which were adopted and will be observed and enforced by the new inspectors who enter upon their duties July 1, 1898. The statute allows the same fees as are prescribed for the testing and branding of petroleum products:

RULE 1. The specific gravity of oil used for illuminating purposes in coal mines must not exceed twenty-two degrees, Tagliabue hydrometer, at sixty degrees temperature, Fahrenheit.

RULE 2. All oil must be tested in a glass-footed cylinder, one and one-half inches in diameter and eight inches deep.

RULE 3. Fill the hydrometer jar to within three-fourths inch of the top, introduce the hydrometer, cool or heat, as the case may be, to sixty degrees, Fahrenheit. Allow the hydrometer to come to rest, read from below, and the last line which appears under the surface of the oil should be regarded as the true reading, care being taken that the hydrometer does not touch the sides of the jar when reading.

RULE 4. Fill a round, clear glass bottle two-thirds full with the oil and shake well; the bead should not show fluorescence similar to that of petroleum products.

RULE 5. Fill an ordinary miner's lamp with the oil, light and note character and quantity of smoke.

RULE 6. All material used for illuminating purposes in coal mines shall be free from smoke, bad odor, and by-products of resin, known as mystic oil.

RULE 7. Paraffine wax should not contain more than three per cent of oil, and the maximum melting point shall be one hundred and ten degrees, Fahrenheit. To test the melting point of paraffine wax, place a chip of it on hot water, then allow the water to cool slowly, and note the temperature of the water when the wax globule loses its transparency.

RULE 8. In all cases of doubt, or question as to inspection, or as to the purity of the oil or paraffine to be used in mines, a sample of the same shall be furnished the State Board of Health for chemical analysis.

The Secretary was instructed to have the foregoing rules published in connection with the revised circular on oil inspection.

COMMUNICATIONS.

The Committee on Communications, Doctor Guilbert, made a report which was adopted. The following being of general interest are published for the benefit of those interested:

First.—A letter from Mr. J. W. Eels, to the Secretary, stating that the new law respecting the collection of deaths and births by the Assessor, was not a success in Muscatine county, and suggesting that the Board use its endeavors to have the law repealed.

Referring to this letter, Doctor Guilbert says:

This Board, of course, has no power to contravene the code, but it clearly has the power, according to its distinguished legal adviser, Attorney-General Remley, to enact such regulations as will give force and power to the statutes of the State. The experience of Mr. Eels, in Muscatine county, does not seem from our information, to be the experience of county officials in many other counties.

It seems singular to your committee, that the simple information regarding vital statistics, which the code requires the county officials to procure from the tax-payers whom he interviews, should be so hard to procure from the people, especially when this information is demanded under oath, yet the suggestion made by the Secretary, with reference to the uniformity in death certificates, is a pertinent one. In the cities and larger towns there has probably, as yet, been no change. The local boards of health still hold, or should hold, physicians to the performance of their duty to report to the City Clerk, and that promptly, all deaths that may occur in their several spheres of action, and this is yet done on the blanks which have been in use for many years, and which are the same all over the State, and which are all regularly turned over, every month, to the County Clerk by the City Recorder, in accordance with local law.

Your committee does not think that this blank can be materially improved by revision. If it be found necessary to do so, we advise that the validity of that form be reaffirmed. We advise further, that if it be found, on inquiry of the Attorney-General, that we have power to do so, that the authorities of the several counties of the State be required to cause our blanks, for the return of deaths, births and infectious diseases, to be printed and distributed as needed to the medical men within their separate jurisdictions. Physicians residing outside the cities should be required to make their returns direct to the County Clerk, by mail or otherwise. The work of the Assessor is supplemental, it seems, to your committee. He gleans, as it were, the aftermath of vital statistics. As for instance, he collects evidence of unreported deaths. We conceive that this question is worthy of the serious attention of the Board.

Second.—In the matter of inquiry from Mr. J. H. Reynolds, Township Clerk of York Center, your committee replies thus:

Our rules require that houses where whooping cough and measles are known to have occurred, are only to be placarded and not quarantined. It is not deemed necessary to disinfect such premises, except, perhaps, in case of the removal of the family from the house in which cases of these diseases had occurred, when the aforesaid house might very properly be disinfected and thoroughly cleansed.

It is, of course, to be understood that although such diseases are not quarantined, wholesome sanitation and reasonable isolation of the sick are matters of vast importance, and should be insisted upon by the local health authorities.

Third.—Replying to the inquiry of Dr. Burbank, of Des Moines.

It is not necessary to report recoveries in cases of measles, but no child should be permitted to re-enter school until at least one week after desquamation has fully ceased, and it is the physician's duty to certify that fact to the school teacher. Where, as is perhaps the rule, no physician has been in attendance, the fact of recovery should be satisfactorily made known to the teacher by the parents or guardian, which evidence of the fact is to be found on the certificate of the health officer.

Fourth.—Relating to the inquiry of Mr. J. F. Conway, Secretary of the Atlantic Cemetery Association.

As the Attorney-General has formally announced to the Board, that the city owning a cemetery outside its own limits has supreme control thereof; therefore, the local board in Atlantic clearly has the power to carry into effect the permit from this Board, to which Mr. Conway refers.

TRANSPORTATION OF CORPSES—EMBALMERS.

Dr. Bancroft, Chairman of the Committee on Corpses, submitted the following rules for the government of funeral directors, which were unanimously adopted:

First.—It shall be the duty of every funeral director, undertaker, or embalmer within this State who may desire recognition by transportation companies and common carriers, for the transportation of the bodies of human beings dead from diphtheria, scarlet fever, glanders, anthrax or leprosy, to conform to regulations made therefor by the State Board of Health, to-wit:

Second.—He may make application to the State Board of Health for a permit to prepare such bodies for transportation. Said application shall contain his full name, age and place of residence, and the certification of two legal physicians of good repute in the place where he resides.

He shall pass an examination before the State Board of Health at such time and in such manner as the Board may determine. Said examination shall comprise the following subjects:

- (a) The visceral anatomy and vascular system of the human body.
- (b) The comparative value and action of disinfectants and germicides.
- (c) The proper method, after embalming, for further safely preparing bodies for transportation.
- (d) The meaning of "contagion," and "infection;" the dangers they beget, and the best methods of their restriction and arrest.
- (e) The signs of death and the best methods of their determination.

And such other topics, general and special, as the Board may from time to time determine.

Seventy-five per cent of satisfactory answers in a scale of one hundred shall be required to entitle the applicant to a permit.

Third.—Upon satisfactory evidence of the competency of the applicant as an embalmer, he may be granted a permit to prepare corpses herein designated for transportation upon the payment of the sum of \$5, to pay the expenses of such examination. Said permit shall be limited to the term of one year, and shall be signed by the President of the State Board of Health, and attested by the Secretary and seal of the Board.

Permits may be renewed upon the payment of \$1 within thirty days after the expiration of the term of a permit.

Fourth.—The failure of the holder of a permit to comply with the regulations of the State Board of Health shall be deemed sufficient cause for the revocation of his permit.

Fifth.—The Secretary of the Board shall keep a record in which shall be registered the name and residence of all persons to whom a permit is granted, and the number and date of the permit, which record shall be for the information of the profession, the public and for transportation companies.

He shall also keep a record of all money received, expenses incurred and paid under these regulations, and make report thereof at each quarterly meeting of the Board.

Sixth.—Bodies of those who have died from diphtheria (membranous croup), scarlet fever (scarlatina, scarlet rash), glanders, anthrax, or leprosy, may be transported by common carriers upon the affidavit of a funeral director, undertaker or embalmer, made under oath, that he is the holder of a permit from the State Board of Health, giving the number of the permit, his name and residence, and certifying that the body has been prepared for shipment in accordance with the regulations of the State Board of Health, to-wit:

In the case of diphtheria.—The body shall be thoroughly injected with a proven disinfectant embalming fluid, and all orifices of the body, such as the nares, mouth, rectum, and vaginae in the female subject, then plugged with absorbent cotton. The body shall then be washed in the disinfecting fluid and wrapped in absorbent cotton layers one inch thick, then bandaged and placed in an air-tight zinc or metallic case.

In case of scarlet fever.—All clothing must be removed from the body, and the whole arterial system and cavities, including the cerebro-spinal, injected with a disinfectant of the highest germicidal powers. The body must then be thoroughly washed with the disinfecting fluid; all orifices plugged with absorbent cotton, then covered with absorbent cotton one inch thick, then bandaged and placed in an air-tight zinc or metallic case.

In case of glanders, anthrax or leprosy.—After protecting the hands by either vaseline or gloves, all clothing which has been around the body shall be removed and burned. The body shall then be thoroughly washed with a disinfectant of the highest proven germicidal powers, and sufficient of the disinfectant and embalming fluid injected into the circulatory system to thoroughly saturate all the tissues of the body. All the main cavities of the body shall be filled with the disinfectant, and all orifices plugged with

absorbent cotton. The body shall then be washed with the disinfectant, wrapped in absorbent cotton not less than one inch thick, then bandaged and placed in an air-tight zinc or metallic case. When the condition of the body demands the removal of the blood, it may be done by using a bottle which contains not less than four ounces of the disinfecting fluid. The vein selected for the operation must be opened carefully and the tube introduced to the right auricle of the heart, and the blood aspirated into the bottle without exposing it to the air of the room, or without coming in contact with the hands of the operator.

Seventh—Disinfectants referred to herein must be approved by the State Board of Health.

Eighth.—The foregoing rules shall go into effect, and be in force on and after September 1, 1898.

FINANCIAL.

The Secretary submitted the following financial report for the four months ending April 30th, which was received and referred to the Auditing Committee:

Board meeting January, 1898.

MEMBERS' EXPENSE ACCOUNT.

R. E. Conniff	\$ 33 00
E. A. Guilbert	32.40
W. Bancroft	30.56
J. A. Scroggs	27 56
E. H. Carter	12.80
W. Dickinson	12.80
J. I. Gibson	29.08
Total	\$ 178.20
Paid by warrant No. 18760.	
January 31, 1898. J. F. Kennedy	100.00
Paid by warrant No. 18798.	

CURRENT EXPENSES FOR JANUARY.

L. F. Andrews, salary	\$ 75.00
George A. Miller Printing Company—	
<i>Bulletin</i>	\$ 36.00
200 extra .....	.75
One page table	1 07
Extra composition	1.78
Total	39.60
United States Express company	7.24
State and Provincial boards of health	5.00
Gertrude Kennedy, mailing <i>Bulletin</i>	4.00
Des Moines Book and Stationery Company—	
One-third dozen T. W. ribbons	\$ 2.66
One gross pens .....	.75
Total	3.41

Hanson Bros., to ten cuts.....	\$ 2.80
Iowa Telephone company .....	.95
Adams Express company.....	.40
Wells Fargo & Co., express.....	.30
Total	\$ 138.70
Paid by warrant No. 18799.	
February 28, 1898, J. F. Kennedy, Secretary.....	100.00
Paid by State warrant No. 7, Series D.	

CURRENT EXPENSES FOR FEBRUARY.

I. S. P. Typewriter	\$ 76.00
L. F. Andrews, salary.....	75.00
E. H. Hunter, postage	22.16
Carter & Hussey—	
Receipt book.....	\$.45
1,000 form 24 E.....	3 25
1,000 envelopes.....	1.00
1,000 form 6 D	6.00
100 form 23 D	2.75
200 form 131 B.....	1.75
300 affidavit.....	1.25
500 disinterment permits.....	4.00
	20.45
Des Moines Book and Stationery company—	
Vagaries of San. science.....	\$ 1.70
Disinfection, R'deal.....	3.60
2 dozen manilla pads.....	1.20
1 quart mucilage.....	.75
2 boxes fasteners.....	.35
	7.60
<i>The Sanitarian</i>	4.00
Gertrude Kennedy, mailing <i>Bulletin</i>	4.00
<i>Domestic Engineering</i>	2.00
<i>Journal of Microscopy</i>	2.00
Western Union Telegraph	1.22
Geo. A. Miller Printing company.....	.67
American Express company.....	.16
Norman Lichty, 1 gallon wood alcohol.....	1.25
<i>Iowa State Register</i> .....	.60
F. R. Conaway—	
6,000 <i>Bulletins</i>	\$ 27.45
2,000 form 28 B.....	9.67
P. W. first form.....	2.00
P. W. 1 add. form.....	1.25
	40.37
Total	\$ 257.48
Paid by State warrant No. 8, series D.	
Board meeting March, 1898.	

STATE BOARD OF HEALTH.

MEMBERS' EXPENSE ACCOUNT.

J. C. Shrader.....	\$ 17.26
E. A. Guilbert.....	25.80
J. A. Scroggs.....	21.81
W. Bancroft.....	21.96
J. I. Gibson.....	23.40
J. A. McKlveen.....	12.32
H. Matthey.....	23.50
W. Dickinson.....	6.40

Total \$ 152.45

Paid by State warrant No. 441.

March 31, 1898, J. F. Kennedy, Secretary \$ 100.00

Paid by State warrant No. 880.

CURRENT EXPENSES FOR MARCH.

E. H. Hunter, postage.....	\$ 340.36
L. F. Andrews, salary.....	75.00
<i>Bulletin</i> postage.....	40.00
L. Young, binding periodicals.....	30.15
F. R. Conaway, printing <i>Bulletins</i>	27.45

Carter & Hussey—

Letter file.....	\$.50
300 form 16 C.....	3.00
½ gross pencils.....	3.00
1 pencil sharpener.....	3.50
	10.00

Smith Premier Typewriter company—

1 platen.....	\$ 5.00
½ dozen ribbons.....	3.50
	8.50

Gertrude Kennedy, mailing <i>Bulletin</i>	4.00
United States Express company.....	3.35
Norman Lichty, ink.....	1.30
American Express company.....	.95
Wells Fargo & Co., Express.....	.45
Western Union Telegraph company.....	.50
Adams Express company.....	.35

Total \$ 542.36

Paid by State warrant No. 881.

April 30, 1898:

J. F. Kennedy, Secretary..... \$ 100.00

Paid by State warrant No. 1498.

CURRENT EXPENSES FOR APRIL.

F. R. Conaway, printing.....	\$ 131.67
L. F. Andrews, salary.....	75.00
L. Young, binding circulars and <i>Bulletin</i>	28.00
Carter & Hussey—	
1 dozen erasers.....	\$ 1.20
100 tubes	3 00
	4.20
Gertrude Kennedy, mailing <i>Bulletin</i>	4.00
Des Moines Book and Stationery company—	
2 reams paper.....	\$ 3 50
1 gross pens.....	.50
	4.00
Western Union Telegraph company.....	1.15
United States Express company.....	.60
American Express company.....	.50
Total	\$ 249.02
Paid by State warrant No. 1497.	

RECAPITULATION.

Board meeting March.....	152.45
Board meeting January	\$ 178 20
January expenses.....	238.70
February expenses.....	357.48
March expenses.....	642.36
April expenses.....	249 02
Total	\$ 1,818.21

The Auditing Committee reported:

Your committee to whom has been referred the Secretary's financial report for the quarter ending May 11, 1898, report that they have found proper vouchers filed for each and every item, and warrants drawn check with bills paid.

(Signed)

WARREN DICKINSON,
J. C. SHRADER,
J. I. GIBSON.

The report was adopted.

ELECTION.

Dr. R. E. Conniff, of Sioux City, was unanimously elected President for the ensuing year, and Dr. J. F. Kennedy was re-elected Secretary of the Board and Editor of the *Iowa Health Bulletin*. Dr. Eli Grimes was re-elected Bacteriologist of the Board, and Prof. S. R. Macy, of Highland Park College, was re-elected Chemist.

STANDING COMMITTEES.

President Conniff appointed the following committees for the ensuing year:

Auditing—Dickinson, Matthey.

Communications—Guilbert.

Contagious Diseases—Shrader, Scroggs.

Corpses—Bancroft.

Diseases of Animals and Veterinary Sanitation—Gibson.

Food and Water—McKlveen, Matthey.

Library and Printing—Scroggs.

Oil Inspection—Matthey, Gibson.

Plumbing and Ventilation—Dickinson, Shrader.

Publications and Rules—Remley, Guilbert.

Schools—McKlveen, Bancroft.

Adjourned to meet the first Thursday in August unless sooner convened by the President.

AUGUST MEETING—1898.

The State Board of Health met in regular session in the capitol August 4th, and was called to order by the President, Dr. R. E. Conniff, of Sioux City.

There were present, in addition to the President, Dr. J. C. Shrader, Iowa City; Dr. E. A. Guilbert, Dubuque; Dr. W. Bancroft, Keokuk; Dr. J. C. Scroggs, Keokuk; Dr. H. Matthey, Davenport; Dr. J. C. McKlveen, Chariton; Dr. J. I. Gibson, Denison, and Mr. Warren Dickinson, C. E., Des Moines. The minutes of the former meeting were read and adopted and the quarterly report of the Secretary was read and received, to be taken up for consideration *seriatim*.

TUBERCULOSIS.

Dr. Shrader, as per appointment, presented a paper upon "Tuberculosis" which was adopted as the official utterance of the Board upon this subject, and the Secretary was directed to have it published in the *Bulletin*, and to have 2,000 reprints therefrom. It was the formal report of the Committee on Tuberculosis, consisting of Drs. Shrader and Scroggs, and is as follows:

Tuberculosis, or as it is more generally known, consumption, has existed from a very early period in the world's history. Owing to the prevalence of the disease, its insidious approach, its great fatality, its easy communicability, and its incurability, after the disease is once well established, it is

necessary that the people of the State should be enlightened in regard to it.

It is an infectious disease, due to a germ, the bacillus tuberculosis. It is characterized by the presence of nodules, called tubercles, which may undergo certain changes—becoming cheesy, or hard and dense, and sometimes ulcerate, or in some instances become calcified. (Stony.)

The scope of this circular will not permit an exhaustive examination of this part of the subject. Tuberculosis is the most universal scourge of the human race. It prevails more particularly in large cities, and wherever the population is massed together. It is estimated that in the civilized countries, one-seventh of the deaths are due to this cause. It is very difficult to obtain accurate statistics in regard to it. In only a few countries can we obtain entirely reliable data, and from these we learn that it is the great scourge of the human race, and indeed it is not entirely confined to this race. Some animals seem especially prone to its ravages. Our cattle, that comprise so large a part of the wealth of the country, and contribute so much to the food we eat, are especially prone to the disease, rendering them unfit for food. Meat thus infected by the bacilli, should not be eaten at all. While thorough cooking would most probably destroy the germ, we know that most persons like their steak rare, and if infected meat is so eaten, it becomes dangerous as an article of diet, and should be condemned.

The milk, also, is liable to infection in many ways. The food designed by the Creator for the young, the infirm and the aged, is thus rendered unfit for their use. It has been demonstrated that milk is a great carrier of contagion. It is very easily infected by the animal from which it is obtained. If tubercles exist in any part of the body, the milk is thereby rendered dangerous, whether obtained from a human being or from one of the lower animals. A tuberculous mother should never nurse her child, nor should milk from a tuberculous animal be given it. If the milker, or any one caring for it, is infected, it is rendered dangerous. The udder should always be cleansed before milking, and then the milk, received in vessels that have been scalded, should be strained through a sterilized cloth or other clean strainer. The stables should be well ventilated, no musty odors, nor foul smelling gases should be permitted. The dairyman himself should be neat and clean. There is no other person in the community who so completely presides over the health and lives of ourselves and our children as the man who supplies us with milk. The great bulk of the milk is collected from the small farmer, whose cattle are never inspected, and who is often the embodiment of carelessness if not of worse. The milk thus collected over wide areas is all turned into a common receptacle, and thoroughly mixed and distributed. How can our children be healthy? How is it possible for one of the dwellers in cities to escape?

The horse is not as liable to the disease as cattle. Rabbits and guinea pigs are especially liable to contract the disease, and, while not so often used for food, may be sources of infection to those coming in contact with them.

Geographical position has very little influence in the spread or dissemination of the disease, though it is more prevalent in the temperate regions.

The germs, or bacilli, exist in great numbers in persons affected by the disease, and may be thrown off in coughing. They are found in nearly all the excretions of the body, of those infected, but by far the greater number exists in the sputum. Nuttall has shown that from one and a half to four

and a third billions of tubercle bacilli are daily thrown off by an individual with moderately advanced pulmonary tuberculosis.

Infection by Inhalation.—It has been shown that the expired air is not infective. Cornet has said, "The consumptive, in himself, is almost harmless, and only becomes harmful through bad habits." The virus is largely contained in the sputum, which, when dry, is disseminated in the form of dust, and constitutes the great medium for the transmission of the disease. If discharged into a handkerchief, it speedily dries, especially if it is put into the pocket or beneath the pillow. In the last stages of consumption, the patient is weak, the sputum is expelled improperly; pillows, sheets, handkerchiefs, etc., are soiled. If a male, the beard or mustache is smeared. Even in the hands of the cleanly, without especial precautions, such circumstances all tend to the production, around the patient, of a halo of infected dust, maintained by every process of bed making or cleaning, which includes the pernicious habit of "dusting." In the hands of the careless and dirty, the infectivity is, of course, greatly aggravated.

It attains its maximum of intensity where the filthy habit of spitting on the floor prevails, especially if it is carpeted.

All rooms frequented by persons suffering from tuberculosis, very soon become infected, and consequently dangerous, such as hospitals, jails, poor-houses, etc.; all such rooms where ventilation and disinfection are neglected are very dangerous, as proven by the great number of deaths of those who are confined in these poisoned abodes. Boats and cars on our great lines of travel, without great care being used, become veritable pest houses.

MEANS OF PREVENTION.—*Sunlight* is one of the most powerful agents in destroying the tubercle bacilli. Avoid imperfectly ventilated dwellings, dark, damp, musty rooms. Let your dwellings be light, dry and well ventilated, with an abundance of sunlight. The *sputum* should always be kept moist. In all public places, spittoons partly filled with water, to which may be added some disinfectant (carbolic acid is recommended as among the best), should be freely distributed, and which all persons who spit should be required to use if necessary.

Spitting in the streets and in all public places should be prohibited. No child should even be allowed to sleep with a person suffering from tuberculosis, especially if of the pulmonary variety.

Persons suffering from tuberculosis should not drink out of the same cup used by other members of the family, and when traveling should carry his own cup, as the microbes will adhere to the cup in great numbers, and thus endanger others.

As most cities obtain their water supply from rivers whose waters are contaminated with sewage, all water for drinking purposes should be boiled before using, thus preventing typhoid fever, as well as tuberculosis. All soiled clothing from tuberculous patients should be thrown into a tub of water, to which some disinfectant has been added, preventing the *sputum* from drying and thus protecting the washerwoman, as well as all others exposed.

In regard to the registration and quarantine of these cases, there is great difference of opinion. New York has such a law, with stringent regulations, but they are, as yet, not very faithfully observed. The time is

coming, and not in the far distant future, when the people, better educated in these matters, will demand legislation that will protect the living from the germs of the most dangerous, because most deadly, of all the diseases that affect the human race.

FUNERAL DIRECTORS.

The Secretary reported the following relative to the examination of Funeral Directors:

The date of the Funeral Directors' examination was fixed at a time to give the largest number an opportunity to be present, and I have had their papers examined and rated before the meeting of this Board. The examination was held on the 26th day of July. I had previously sent a copy of our rules, relative to the transportation of bodies and the examination of Funeral Directors, with a letter of explanation, and an application blank, to between eight and nine hundred undertakers in the State. There were quite a number of letters that were written here, in reply, and there seemed to be a great deal of interest in regard to this examination, and this new work of the State Board of Health.

I think I may say, however, that no line of work has been taken up by the Board that has met with as much approval, if not enthusiasm, by the persons interested as has this. There were present at the examination sixty-four. A few who applied, sent in excuses, stating that they would not be able to be present, but would be at a later meeting.

As directed by the Board, Doctor Guilbert and Doctor Scroggs furnished the questions, of which there were thirty-nine.

The examination was conducted in the same method as the examination of physicians, by writing and by confidential numbers. Doctor Guilbert and Doctor Scroggs kindly consented to come to this office yesterday and rate these papers, and they will be able to present their report to you at this meeting.

The Committee on Examination reported that of the sixty-four examined, fifty-nine had reached or exceeded the seventy-five per cent required by the Board "to pass," three or four having earned a rating of one hundred.

The Board directed the Secretary to issue permits to those having passed. A form of permit was adopted and the Secretary was directed to have five hundred lithographs thereof printed. The date of the next examination was fixed for October 27th, after which, beginning with the last week in January, the examinations will be held *semi-annually*.

DELEGATES.

Doctor Scroggs was elected a delegate to the annual meeting of the American Public Health Association, at Ottawa, Canada.

Mr. W. Dickinson and Doctor Matthey were elected delegates to the Conference of State and Provincial Boards of Health of North America, to be held at Detroit, August 9th to 11th.

LIBRARY.

The Library Committee, Doctor Scroggs, reported in detail the additions to the library and the cost thereof.

ILLUMINATING OILS AND LINSEED OIL.

The Committee on Illuminating Oils (kerosene and miners' oil) and Linseed Oil, Doctors Matthey and Gibson, reported in favor of the adoption of the form of Circular of Rules and Regulations as presented and recommended by the Secretary and the publication of an edition of five hundred copies thereof.

The report was adopted.

COMMUNICATIONS.

Leprosy.—Dr. Guilbert, Committee on Communications, reported relative to the case of leprosy at Roland, "that this Board has no power to do more than to offer its advice to the local board of health—since it cannot be possible that such a board does not exist in Roland. It is the bounden duty of that body to cause the suspected case of leprosy to be isolated from the public promptly and also completely. If no local board exists in this village the authorities of the place are living in open violation of the law and might be proceeded against in a court of justice. * * * There is no resort in Iowa to which cases of leprosy can be sent, therefore duty and humanity as well devolve the care and maintenance of such cases upon the health boards or county authorities, as may be arranged between them."

Transportation of Corpses.—Replying to several general baggage agents of railway companies relative to the form of "Transit Permits" used for the transportation of corpses, Dr. W. Bancroft reported as follows:

I would suggest that transportation permits be printed on different colored* paper, which would show whether the body had been prepared by an embalmer holding a permit or not. As those holding such permits from the State Board of Health will be allowed to ship cases named in "Rule 2" in air-tight cases, and those named in Rules 3 and 4 without air-tight cases the color of the transit permit would indicate whether a competent or

* The Board adopted "yellow" as the color of the permit to be used by licensed embalmers for shipping bodies dead of infectious diseases.—*Secretary.*

incompetent embalmer had prepared it. It should have a place for affidavit in cases of Rule 2, and for the number of the permit.

Report adopted.

DR. W. H. DICKINSON—CONDOLENCE.

Dr. Guilbert offered the following, which was unanimously adopted by a rising vote:

Resolved, That the State Board of Health, in quarterly meeting assembled, regrets to hear of the serious illness of our former colleague, Dr. Wilmot H. Dickinson, who was one of the honored organizers of this Board, and who for fourteen years was an efficient member. We unanimously and sincerely tender our genial friend and brother our fraternal condolence. We invoke upon his head the blessings of Divine Providence, and earnestly hope he may soon be restored to health and enabled to resume active work in the profession he so dearly loves and has so faultlessly adorned.

DISINTERMENT PERMITS.

The applications to disinter the bodies of the Gorman children that were laid over from the last meeting were approved under the usual specified conditions.

Permission was also given to disinter the remains of Flora Bell Russell, dying of diphtheria, from one lot in Forest cemetery, Oskaloosa, to another lot in the same cemetery.

Also to inter at Lansing, Iowa, the body of Hazel Juel Watson, aged 4 years, who had been interred at Mound City, Ill. Cause of death, membranous croup. To be transported by railroad. Disinterment and transportation to be in compliance with the laws of Illinois and Iowa, and interment with the consent of the local board of health of Lansing.

IOWA HEALTH DEPARTMENT.

Dr. Guilbert read a paper prepared by him to be read before the conference at Detroit on the Evolution of Sanitation in Iowa, as illustrated by the history of the Iowa State Board of Health, showing its parentage, noble birth, healthy growth, present status, and the beneficent results of its efforts. The paper was heartily commended.

[It will be found elsewhere in this report in full.—SECRETARY.]

FINANCIAL.

The financial report of the Secretary for the quarter ending July 31st was presented and referred to the Auditing Committee, Dickinson and Matthey, who reported that they had care-

fully audited the report and found it correct in every particular.

The report was as follows:

Board meeting May, 1898.

MEMBERS' EXPENSE ACCOUNT.

J. C. Shrader	\$ 21.36	
W. Bancroft	24.91	
J. A. Scroggs	24.28	
R. E. Conniff	31.25	
H. Matthey	24.75	
W. Dickinson	9.60	
E. A. Guilbert	28.15	
J. A. McKlveen	13.82	
J. I. Gibson	24.33	
<hr/>		
Total		\$ 202.43
Paid by State warrant No. 1789.		
May 31, 1898. J. F. Kennedy, Secretary		100.00
Paid by State warrant No. 2855.		

CURRENT EXPENSES FOR MAY.

L. F. Andrews, salary	\$ 75.00	
State and Provincial boards of health	20.00	
Western Union Telegraph company	4 06	
L. Young	13.50	
<hr/>		
Total		140 06
Paid by State warrant No. 2856.		
June 30, 1898, J. F. Kennedy, Secretary		100.00
Paid by State warrant No. 3433.		

CURRENT EXPENSES FOR JUNE.

Margaret S. Schoonover, stenographer	\$ 50.00	
Des Moines Book and Stationery company—		
1 pint ink	\$.35	
2 ounces violet ink .....	.08	
1 pint carbon ink .....	.40	
1 dozen carbon paper .....	.60	
1 dozen note books .....	.50	
<hr/>		1.93
Des Moines Rubber Works, stencil	1.00	
C. W. Smiley, <i>Health Journal</i>	1.00	
E. H. Colgrove, works on hygiene	36.30	
<hr/>		
Total		\$ 90.23
Paid by State warrant No. 3434.		

CURRENT EXPENSES FOR JULY.

J. F. Kennedy, Secretary	\$ 100.00
Margaret S. Schoonover, stenographer	50.00
E. A. Guilbert, engraving	2.00
J. F. Kennedy, notarial commission	7.75
G. F. Lasher, postal guide	2.00
Western Union Telegraph company	1.02
United States Express company	2.59
F. R. Conaway, printing and engraving	212.61
Carter & Hussey, stationery	1.65
Western Union Telegraph company (May)	1.48
American Express company .....	.98
Adams Express company .....	.30
L. Young, binding <i>Bulletin</i>	40.50
Total	\$ 322.88

Paid by State warrant No. 4379.

RECAPITULATION.

Board meeting, May	\$ 202.43
May expenses	240.06
June expenses	190.23
July expenses	322.88
Total for quarter	\$ 955.60

Adjourned to meet Wednesday, November 2d *prox.*

NOVEMBER MEETING—1898.

The State Board of Health met in regular session November 2d, with President Conniff in the chair.

There were present, Drs. Conniff, Guilbert, McKlveen, Shrader, Scroggs, Bancroft and Matthey, and Dr. Gibson, State Veterinary Surgeon.

After the reading of the minutes, which were approved as read, and the reading of the quarterly report by the Secretary, the Board proceeded to the consideration of the items in the Secretary's report, and to the reports of standing committees.

TRANSIT PERMITS.

The Committee on Corpses, Dr. Bancroft Chairman, reported forms of permits for the transportation of corpses, which were adopted. In all ordinary cases a form very nearly uniform with those now used by most railroads, printed on "white" paper was recommended. Those permitting the shipment of bodies under Rule 2 will be printed on "yellow." Copies of the forms will be furnished to all railway companies, to be printed by them on white paper and furnished to their respective station agents. The latter form will be printed by the State Board of Health and furnished only to those who hold an embalmer's permit—since no one can, under Rule 2, prepare for shipment bodies dead from diphtheria, scarlet fever, etc., except licensed embalmers.

IN MEMORIAM.

Dr. Guilbert presented the following memorial respecting the death of Dr. Dickinson, which was unanimously adopted by a rising vote:

IN MEMORIAM.

PROF. WILMOT H. DICKINSON, A. M., M. D.

Born 1828. Died October 26, 1898.

"Call it not vain; they do not err
Who say that when the scholar dies,
Mute nature mourns her worshipper,
And celebrates his obsequies."

In common with his large clientele, his State University associates and his medical contemporaries; in common, in fine, with all those public and private interests in which this manly, cognitive and able man was, for more than a generation, a leading factor, the Iowa State Board of Health deplores the loss which the commonwealth suffers, because of the translation of our unforgotten former colleague, Dr. W. H. Dickinson.

Our dead friend was an influential member of this Board for the ten busy years succeeding the date of its creation. He helped to shape into forms of symmetry its considerate decrees.

Modest, capable, and always loyal to *noblesse oblige*, he won the affection and the manly respect of his associates of that historic decade. With him, as with his colleagues, "service sweat for duty, not for meed." During that effective service he wrote his name in enduring characters on our annals. The good he did in all the varied relations of his useful life lives after him. Hence he leaves to his bereaved family, of whom he had for so long been the mentor and lover, the legacy of "a good name, which is better than precious ointment." If we grieve who were only his appreciative friends, how poignant must their sufferings be who look upon the vacant chair by yonder pleasant ingle-side and long

"For the touch of a vanquished hand,
And the sound of a voice that is still."

We share their sorrow, and their hope is ours, that in a little while we shall all, family and friends, rejoin the departed in the Land of the Leal, where the powers of the immortal soul, loosed from earth impedimenta, become capable of indefinite achievements in knowledge. Our dead friend, as the writer knows, was a believer in this divine idea, whose principal expression is found in the words of "The Preacher": "The day of a man's death is better than the day of his birth. He who pens this heartfelt tribute to the memory of one whom he loved for his qualities of head and heart, knew him first forty-three years ago, when we met in a mid-west city, he as a member of the graduating class and the writer as one of the faculty of that yet flourishing medical school. The auguries then made concerning his future have been amply fulfilled in a noble career, which has honored himself and advantaged scientific medicine. The association then began in amity continued in concord even until "death," who "loves a shining mark, a signal blow," anchored the proximate end of the fraternal chain to the throne of Him in whose everlasting arms the just are upheld. And so full of years and honor, this unobtrusive royal gentleman goes to the equal, grave with our tearful benedictions. We give

"His body to this pleasant country's earth,
And his pure soul unto his Captain, Christ,
Under whose colors he had fought so long."

AMERICAN PUBLIC HEALTH ASSOCIATION.

Doctor Shrader read the following report of the annual meeting of the above named Association which he, in company with Doctor Gibson, attended at Ottawa, Canada, October 27th-30th, inclusive, as delegated by the Board:

The Association convened at the city hall, presided over by Doctor John Sweetland, chairman of the local committee of arrangement. Prayer was offered by Rev. William Moore, D. D. The Hon. Sidney Fisher, Minister of Agriculture, welcomed the delegates in a most fitting speech, and in the most eloquent and forceful language dwelt upon the high and noble calling of the members, and the great good this, and all other sanitary associations, are doing for the alleviation of human suffering, and for the staying of the progress of disease and the prolongation of human life, and welcomed the delegates to Ottawa, the beautiful city, the Capital of Her Majesty's loyal subjects in North America. The Mayor, Bingham, of Ottawa, delivered an ornate address, welcoming the delegates and pointing with pride to the entwining of the flags of the three great countries of North America, Canada, the United States and Mexico, and spoke in glowing terms of the "brotherhood of man," and the unselfish and beneficent objects of the Association. He said: "There can be no higher motive in life than the prevention of disease; the amelioration of human suffering and the general dissemination of the great truths of sanitary science; that to-day, it is considered an honor of honors to be enrolled in your ranks as a member; and a privilege the greatest intellect in the land should seek to possess, and to unhesitatingly consummate. Those who have made themselves acquainted with the valuable services which you have rendered during the twenty-seven years of your existence, not only to the United States, but to the world at large, in matters of preventing the introduction and spread of diseases; in circulating sanitary knowledge for the good of the State, the home and the individual; in providing means to have pain of the afflicted lessened; in reducing the rate of mortality; in giving greater hope to men and women, and greater skill to those whose professions call them to the front, when plagues or epidemics invade our country, our cities or our towns, or sickness clouds the joys of our homes; those, I say, who have made themselves so acquainted, cannot but seriously realize the importance of your mission and the immeasurable good that accrues from your interchange of ideas upon the several matters which you have come here to consider and discuss. Among other things you come here to tell us of domestic hygiene, or the art of preserving health; of the best measures to be adopted by which that end may be accomplished; and to make that knowledge public, so that all who wish may govern themselves accordingly, and be greatly benefited thereby. Gentlemen, that alone should suffice to have you welcomed to our city in unreserved terms of approbation; in joyful demonstration."

Sir James Grant followed in some timely remarks in regard to the increasing interest that was being taken in sanitary matters, and said that he had just returned from the meeting of the British Medical Association at Edinburgh; and that sanitation and hygiene occupied a good share of the time of the meeting. Dr. Lindsey, the President of the Association,

then delivered an able address, the main thoughts being whether modern methods of life tend to prolong existence; urging the necessity of collecting vital statistics; and the employment of competent local health officers, who should receive a salary sufficient to enable them to devote the time necessary to look after the health of the citizens in his jurisdiction. He emphasized the objects of the Association, the advancement of sanitary science, and the promotion of efficient measures for the practical application of public hygiene. He said: "Civilization is a power exerting an influence upon human life in many directions. It is part of man as an intelligent being, controlling in a measure his own destiny, to so direct the progress and developments of civilization, that the good shall ever more and more predominate over the evil, and tend to his permanent evolution and prosperity. Consider how science as a product of civilization has stamped out the fatal epidemics of former times. In past ages these terrible pestilences swept off half the population of Christendom. What wonderful achievements sanitary science has accomplished, and still we find much to do. We must be co-laborers and work with might and main to stop these dreadful epidemics that have swept over our earth from time to time. Vigilance is the price of health, as well as of liberty. The people must be educated. Boards of health are doing a great work, as demonstrated by the prompt controlling of epidemics, and by rendering infected districts safe from the poisonous germs that have swarmed there in countless millions."

After two hours of solid pleasure, the meeting closed, and thus the session was formally opened for the regular work before it. Among the papers read at the first day's meeting, was one by Mrs. Ellen B. Richards, of Boston, on the urgent necessity of instruction on sanitary science in the public schools of the country. The youth of our land should be taught hygiene. The elements on this subject should be thoroughly impressed upon the minds of the young, thus awakening an interest in this important subject. By thus educating the people, disease can be prevented. She claimed that much of the sickness during the late Spanish-American war was due to the ignorance of the officers. The diseases were largely preventable, and a knowledge of the laws of hygiene would have saved hundreds of lives, and those, too, of the flower of the country. Mrs. Richards advocated the appointment of a committee to prepare a small book for use in the public schools.

The next paper was "What Constitutes an Epidemic?" This has seemed a knotty question. The dictionary says that disease is epidemic when it attacks many persons at the same time. Dr. Lee claimed that it should be determined by the rapidity of its spread. The "Causes of Typtoid Fever" were considered at some length, but especially in regard to its dissemination. The alvine evacuations from one patient had been carelessly thrown into a stream, and, following this, the disease had made its appearance in a large number of persons who had been using water from this polluted source. The enlightenment of the people on this subject was strongly urged.

Dr. Bryce, Chairman of the Committee on the Causes and Prevention of Disease, submitted a lengthy report. The Doctor seemed to think that the subject was too broad to be handled in a single report. After making some very pertinent remarks the committee was continued.

The forenoon of the second day was devoted to the discussion of yellow fever. Ex-President Dr. Henry B. Horlbeck, health officer of Charleston, S. C., chairman of the committee, had conferred with President McKinley, and had succeeded in having a committee appointed by Congress from the army, navy and civilians who have been thoroughly at work, and will continue their labors. He referred to the various claims made in the discovery of yellow fever bacilli. Dr. Liceaga, of the City of Mexico, had a very interesting paper on the same subject.

Dr. Wende, health officer of Buffalo, N. Y., presented the report of the Committee on the Causes and Prevention of Infant Mortality. He said: "Vigilance in regard to the purity of milk and water supplies are absolutely necessary." Where proper precautions are observed the mortality has been greatly diminished, but the report dwelt mainly on the dangers in the use of the *long rubber tube of nursing bottles*. Numerous tubes had been examined, and all were infected, showing conclusively that these long rubber tubes, containing great quantities of germs, were destroying the innocents all over the civilized world where they are used. Dr. Sulter, of Herkimer, N. Y., favored the enactment of very stringent laws prohibiting their sale.

The afternoon was mainly devoted to tuberculosis. It was conceded that no more important subject could engross the attention of the delegates. The subject was opened by the reading of a paper by Dr. Irving A. Watson, formerly Secretary of the Association, and now President of the New Hampshire Board of Cattle Commissioners, on "Bovine Tuberculosis." He considered that the tuberculin test was not nearly so infallible as has been supposed, and claimed that when cattle were infected they were not necessarily unfit for food. His claims may be summed up in the following conclusions: (1) That it is impossible to fully eradicate bovine tuberculosis, but that it may, without inflicting too great a burden on the State, be reduced to a degree that will subserve the interests of the stock raisers and likewise protect public health. (2) That a very small proportion of the animals infected with tuberculosis in any way endanger the public health, and that an indiscriminate slaughter of the cattle reacting to the tuberculin test is wholly unnecessary, inasmuch as many of them either recover, or the disease is permanently arrested. (3) That a proper sanitary condition of stables and stable enclosures would do more toward preventing the spread of bovine tuberculosis than any other measures that could be adopted. (4) That the danger of infection from bovine tuberculosis may be reduced to very small proportions, if not wholly eradicated, by sanitary measures, inspections, and physical examinations by the State, in co-operation with local authorities. (5) That such inspections, once inaugurated, could be maintained without an expense that would be burdensome to the State.

These propositions, or rather conclusions, elicited a free discussion, in which Dr. Gibson of this Board, took an active part, disagreeing with the claims of Dr. Watson, that veterinarians, from physical examination, could diagnose cases of bovine tuberculosis far enough advanced to be dangerous to the public health, and condemning the paper wherein it tolerated the keeping of cows, tuberculous to a certain extent, in dairies; putting the question to Dr. Watson: "Supposing a careful tuberculin test was made

upon a dairy cow, apparently in a good condition, but giving a positive reaction, indicating the existence of tuberculosis to some extent, would you use that cow for your family cow?" Dr. Gibson claimed that all cattle reacting to the tuberculin test, should be slaughtered, subject to post mortem examination by the United States inspectors at the packing houses, the owner receiving the actual value of the cattle, as revealed by the said post mortem.

Dr. Bracken of Minnesota, thought that a great amount of unnecessary killing had been done, but much of it was absolutely necessary, and feared the effect of the paper would doubtless be against the tuberculin test. Many other distinguished sanitarians took part in the discussion. This naturally brought up the whole subject of tuberculosis for consideration, and much time was spent in its discussion.

Dr. Bryce, of Ontario, thought houses in which consumptives have lived should either be renovated from top to bottom, or be torn down. The "pollution of water supplies of cities and towns," including, also, the farm "well," was carefully considered. Some of the most malignant and dangerous diseases were induced by drinking impure water, as these diseases are preventable, hence the necessity of pure water. The "disposal of sewage and garbage in our cities" came up on the reading of a paper by Dr. R. M. Burke, of London, Ontario. He said on the disposal of sewage at the insane asylum at that place, that they were spreading the sewage on land that was being cultivated for gardening and fruit raising; and that the crop raised in ground thus fertilized was enormous, amounting to \$200 per acre. There were many other valuable papers read and discussed, but this brief review of the work done must suffice for this occasion.

(Signed)

J. C. SHRADER,

J. I. GIBSON,

Delegates.

The report was duly received and ordered placed on file.

TESTIMONIAL—COL. GEORGE E. WARING, JR.

The following testimonial, respecting the life-work and untimely death of the late Colonel Waring, was presented by Dr. Guilbert and unanimously adopted:

The Iowa State Board of Health desires to join in the country-wide tributes to the memory of this distinguished sanitary expert, whose labors have been so helpful to the science, whose genius devised methods, particularly in the direction of municipal hygiene, which will never lose vogue, and which may be considered as monuments to his memory, that are more enduring and more significant than monuments of bronze or stone. Inscriptions on those latter would not always be recognized as referring to the dead whom they exploit, should their disembodied spirits "revisit the glimpses of the moon" for the purpose of reading them.

Waring's mortuary remembrances, on the contrary, cannot be too florid in commendation of the notable career as a scientist, the valuable public services of this unassuming but wonderfully gifted man, who really died at the front, a martyr to the fell disease which he had so successfully fought

in the past, and by which he was stricken at Havana, while engaged in the service of the United States government as a sanitary expert.

It is gratifying to hear, as we do through the press dispatches, that Colonel Waring's official report as to the methods of sanitation necessary to be applied to the old-time pestholes of Cuba—those sources of epidemics which have for so long been afflicting our sea-board cities and their tributary territories—was completed on his voyage from Havana to his honored grave in New York, and will become the guide of the government in the vast work it must perform, in order that its duty to the people may adequately be fulfilled.

This Board mourns the loss to science of this brave soldier, this accomplished sanitarian, this genial gentleman whose life-work blessed humanity, and as a past-master of science made his "one of the few immortal names that were not born to die."

KEROSENE, MINERS' AND LINSEED OILS.

The committee on the above named subject reported a form of circular giving rules, regulations and instructions for the inspection of these products. The circular was adopted as reported, and the Secretary was directed to have 1,000 copies printed for distribution.

[The full text of this circular will be found elsewhere in this report.—SECRETARY.]

COMMUNICATIONS.

Dr. E. A. Guilbert, Committee on Communications, reported as follows:

The first item considered was the following letter from Hon. Phil Schaller respecting rag mattresses:

SAC CITY, Iowa, August 2, 1898.

To the Honorable State Board of Health, Des Moines, Iowa:

GENTLEMEN—Allow me to call your attention to the so-called "wool mattress" and "woolen quilts" of which so many are sold and used in Iowa, while in some States (New York, for instance,) their sales are prohibited. What are these woolen mattresses filled with? Have you ever seen any taken apart? I have of late seen some taken apart. I am only surprised that the State is as thickly populated as it is after so many of our people are sleeping on such filth. My home was no exception to this rule, and I find that many other families here were not without "spare beds" made up with wool "mattresses." The larger part of these mattresses are made of old clothing, rags, etc., run through a machine which tears these rags and brings the material back to its original state, either wool or cotton, as the case may be. It leaves many whole pieces. In opening some of these mattresses here within the past few days we found pieces of underwear (not very clean either).

During the cholera, about five years ago, you will doubtless remember of tons of old rags having been thrown overboard in our ports, which were being shipped to the United States for that purpose. We should enforce

the cholera regulation in regard to the importation of rags the year around.

Gentlemen, I would suggest to you that you examine some of these mattresses, personally. If you strike the right ones (and you will) you will be as astonished as I was. I never would have believed it.

The so-called "wool mattresses" are usually very heavy mattresses. The rags of which they are made are mostly picked up in streets and alleys and gathered by the rag pedlars, and many of our people are sleeping on and under those rags without knowing it.

There is no doubt in my mind that much sickness and many deaths were caused by sleeping on such filth, although hidden under a neat cover. Since we have discovered it in our town, "wool mattresses" are at a heavy discount. I understand that there are woolen bed quilts made of the same material; that, however, I have not seen personally. A landlady here informed me that she burned five of her quilts last spring after she discovered it. Trusting that you will satisfy yourselves personally as to this matter, and then you will be fully able to decide for yourselves what is best to do from a sanitary standpoint,

I am very respectfully yours,

PHIL. SCHALLER.

The following is Dr. Guilbert's reply:

In the matter, the timely contention, submitted by the Hon. Phil. Schaller. There is no question that Mr. Schaller is entirely right in his denunciation of this unspeakable woolen mattress abnormity. Your committee can confirm, from a limited observation, all he says of the unsanitary and dangerous character of these commercial evidences of man's greed. So far as my own experience goes, in one city, the rags collected from infected and uninfected houses alike, and from the gutters and alley refuse heaps, are filthy in the extreme, and full of danger to the public health, even in the warehouses in which they are kept pending sale. The Christian house furnishers who buy and use these abominations in the manufacture of so-called woolen mattresses, claim to cleanse and disinfect these rags before using them, but there is no question but that such cleansing and disinfecting is done in a perfunctory manner, by men whose acquisitiveness is in inverse proportion to their knowledge of sanitary processes. I once opened one of these dangerous articles and examined it carefully. It was sold by a man who assumed to be one of the "Lord's anointed." It was composed of just such rags as those mentioned, ante, and which were collected, in the manner specified, by those horn-blowing city nuisances, whose very touch added filth to filth. As to that mattress: The pious deceiver aforesaid solemnly assured the buyer that the contents had been desiccated, cleansed, steamed and chemically purified. In it, however, were found long pieces of alleged white and colored cotton rags, not at all inodorous, also the middle portion of a pair of cheap woolen trousers, having stains upon them, which clearly showed that their sometime wearer had not been "chaste as an icicle."

This examination of a mattress, bought of a reputable dealer only a few months before, was occasioned by the suspicion that certain cases of mysterious sickness had that bed for their *foens et origo*. We could not doubt the correctness of that suspicion on investigation.

At the 1895 meeting of the American Public Health Association, a very intelligent furniture dealer of Denver, Mr. George J. Kindel, made a vigorous plea against these death traps, and presented for inspection numerous specimens of rags which, he averred, had not been selected, but had been taken at random from the bellies of curiosities of this sort. It was "a spectacle for gods and men," but strange to say, these object lessons, reinforced, as they were, by the eloquent denunciation of a man of standing, who knew "whereof affirmed," did not interest that gathering of sanitarians sufficiently to allow it to have its legitimate right of way, when brought into competition with a junketing episode that afternoon. Mr. Schaller is to be commended for the interest he, as a layman, has taken in the furtherance of sanitary processes. Your committee respectfully recommends the appointment of a special committee to formulate rules for local boards of health, respecting this important matter.

In accordance with the foregoing recommendations, the President appointed Drs. Guilbert, Scroggs, McKlveen and Grimes, who later reported the following, which was adopted:

PROLOGUE.

It having come to the knowledge of the State Board of Health that the ordinary "wool" or rag bed quilts and mattresses manufactured in Iowa, or imported into the State and largely sold therein, are composed of unsanitary and often filthy materials, and, therefore, are a menace to the public health; further, that it is a fact that danger to the public health also lurks in the upholstered furniture, the carpets, the mattresses and bed clothing stored for sale in the numerous second-hand stores of our towns and cities; and further, as we have reason to believe that the present methods of carpet cleaning, as exemplified in the carpet cleaning establishments of cities and towns, are also menaceful to the public health; therefore, the Iowa State Board of Health decrees the subjoined rules, devolving upon local boards of health in this State, through the health officers thereof, the duty of their early and strict enforcement:

RULE FIRST.—The proprietors, or managers, of all factories or stores in Iowa, which are devoted in whole, or in part, to the manufacture of so-called woolen-rag bed quilts and mattresses, from and after the publication of these rules, are required to cause all rags, collected for use in the aforesaid industry, to be dusted, torn into small fragments, and rinsed in clean water—preferably under a forcible hydrant stream—before they are used in the manufacture of the woolen-rag bed quilts and mattresses aforesaid; and when the completed article is ready to be put on the market, it shall, before being offered for sale, be thoroughly disinfected in the manner specified hereinafter. This rule as to the disinfection of completed woolen-rag mattresses and bed quilts shall also apply to such articles elsewhere manufactured and imported into, and put on sale in, the State of Iowa.

RULE SECOND.—It is ordered: That all mattresses sent to mattress factories for renovation, shall be subjected to thorough disinfection before being returned to their owners.

RULE THIRD.—It is ordered: That all vendors of second-hand upholstered furniture, bed clothing, carpets, rugs and mattresses, shall be

required to disinfect such articles, in the manner hereinafter specified, before putting them on sale.

RULE FOURTH.—It is ordered: That all articles named hereinbefore, after having been disinfected in the manner specified hereinafter, shall, as evidence of that fact, have securely attached to each one a label, on which is printed, in large type, these words, "Disinfected in accordance with the rules of the Iowa State Board of Health." Said label to be provided and attached at the expense of the manufacturer or vendor, under the possible supervision of the local health officer.

RULE FIFTH.—It is ordered: That all carpets, rugs, etc., sent to a carpet-cleaning establishment for the purpose of being cleaned, shall be disinfected, after the dusting process has been completed, and in the following manner, to-wit: The carpets, rugs, or other articles that have thus been cleaned in the said carpet cleaning establishment, shall at once be sprayed with a two-per-cent solution of formaldehyde, in the proportion of one fluid ounce of that agent to each square yard of carpet, rug or other article. Then, immediately, said article shall be tightly rolled and placed aside in a clean apartment, where it shall remain for at least ten hours undisturbed before being returned to the owner. To each article thus disinfected, the label, prescribed in rule fourth, shall be attached, showing that the disinfection required by law, has been done. The local health officer shall exercise a general supervision over these carpet-cleaning establishments, also.

RULE SIXTH.—For the information of those concerned, the subjoined explanation of the inexpensive apparatus and methods, necessary to be employed to carry into effect these rules, is now given. In mattress factories or second-hand stores a tight, pine board box, planed within, should be provided as a disinfecting chamber. It should be sufficiently large to hold a dozen mattresses, etc., at once. They should be separated by slat partitions, onto which the mattresses, etc., should be placed flatwise. In second-hand stores such a disinfecting chamber would hold a variety of upholstered furniture, on top of which mattresses or other articles of bed wear could be spread out.

Then a copper or tin receptacle, cylindrical shape and holding at least one-half gallon, having a screw top, fitting absolutely air-tight, should be provided. A substantial metal support carries this receptacle or can and holds beneath it an alcohol lamp or other heating device. If an alcohol lamp, it should give a flame sufficiently large to spread over the entire bottom of the receptacle and hold not less than eight ounces. If other means of heating are used they must produce very rapid boiling of fluid in the receptacle. Slow heat will not produce the required results.

At or near the top of the apparatus is a metal tube connecting with the interior and fitted with a flexible rubber tube which terminates in a metal or hard rubber nozzle. The apparatus must be so made that it will not clog, or serious explosions may occur.

In one lower corner of the disinfecting chamber a small hole is bored through its wall. When the articles to be disinfected are well adjusted in the aforesaid chamber, place in the can the disinfecting agents—that is to say, one ounce of powdered borax to each pint of forty-per-cent solution of formaldehyde (formaldehyde alone cannot be used). Such a can as that

described above would hold four pints of formaldehyde and four ounces of powdered borax. The materials being thus placed in the can, fill the alcohol lamp with best alcohol, light and place it under the can. Introduce your metal or hard rubber tube into the hole bored in the box and then leave the apparatus to work for at least forty minutes after it commences to boil. The formaldehyde will have become vaporized and will have filled the chamber. Then remove the tube from the chamber and tightly plug the hole, leaving the box undisturbed for at least twenty-four hours. The purpose had in view will then have been accomplished.

GUILBERT,
SCROGGS,
MCKLVEEN,
GRIMES,
Special Committee.

Second.—Concerning the query of Township Clerk Fraser, of Rolfe, Doctor Guilbert reported: “Mr. Fraser should consult a competent lawyer as to the legal question involved in the proposition to take over cemetery lots unpaid for. This being decided in the affirmative, then his question as to the removal of the emblems of mortality would be a matter to be considered by this Board when all the facts are fully made known to it—that is to say, when the diseases of which those dead died, and the date of death of each one among the facts presented. Your committee, in the interests of humanity, cannot refrain from asking Mr. Fraser if so intelligent a gentleman as himself does not regard it rather inhuman to propose reinterring these remains in the potter’s field?”

The report was received and adopted.

Third.—Dr. Guilbert reported further as follows: Replying to Mr. Elsbery, of Marion, who desired to know to what extent cities are responsible for refusal or neglect to abate a nuisance declared to be a menace to public health: “Mr. Elsbery seems to have a legitimate cause for action against the city. He is advised by this Board to counsel his legal adviser and proceed under the code. If he can make it appear to the court, as it would seem he can, that the city authorities have been derelict in duty, in not abating a palpable nuisance, he certainly can recover damages, besides reforming a public abuse. This Board has no judicial powers. If it had such a complaint as that made by Mr. Elsbery, would at once be investigated and the sanitary remedy would be duly applied.”

The report was received and adopted.

DISINTERMENT PERMITS—SPECIAL.

Special disinterment permits were issued upon the recommendation of Dr. Bancroft, Chairman of the Committee on Corpses, as follows:

Frederick Grant Woodward, *scarlet fever*, to be removed by hand from one lot to another in the same cemetery.

Mattie Estelle Denison, *diphtheria*, to be removed by private conveyance from Lewis to Atlantic.

Clarence Kelly, *membranous croup*, to be removed from one lot to another in the same cemetery.

Mabel Connell, *pseudo-diphtheria*, to another lot in the same cemetery.

Frank Lee, *diphtheria*, to another lot in the same cemetery.

Leroy Leffler Kelly, *diphtheria*, to another lot in the same cemetery.

The application to disinter and remove the remains of Suzette Marie Sutton, dying of *scarlet fever*, by railroad to Philadelphia, was refused.

FINANCIAL.

The Secretary submitted the following financial statement for the quarter ending October 31st, which was duly audited by the Auditing Committee and reported correct. The report of the committee was received and adopted.

Board meeting August 5, 1898.

MEMBERS' EXPENSE ACCOUNT.

J. C. Shrader	\$ 17.41
J. A. McKlveen	13 32
E. A. Guilbert	29.00
W. Bancroft	21.96
J. A. Scroggs	22.06
H. Matthey	26.50
J. I. Gibson	21.58
R. E. Conniff	31.00
Warren Dickinson	10.00
Total	\$ 191.83
Paid by State warrant No. 4453.	

SPECIAL EXPENSE ACCOUNT.

E. A. Guilbert, attending Detroit meeting	55.30
Paid by State warrant No. 4579.	

CURRENT EXPENSES FOR AUGUST.

J. F. Kennedy, Secretary	\$ 100.00
Margaret S. Schoonover, stenographer	50.00
Des Moines Book and Stationery company, mucilage	1.50

F. R. Conaway—

6,000 <i>Bulletins</i>	\$ 27.45
2,000 reprints	4.75

Total	\$ 32.20
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L. Young, binding <i>Bulletins</i>	9.00
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Total	\$ 192.70
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Paid by State warrant No. 4799.

CURRENT EXPENSES FOR SEPTEMBER.

J. F. Kennedy, Secretary :.....	\$ 100.00
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Margeret S. Schoonover, stenographer.....	50.00
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L. Young—

Folding circulars	\$ 2.00
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Binding <i>Bulletins</i>	9.00
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Total	11.00
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J. F. Kennedy, street car fare.....	1.40
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Smith-Premier company, one ream paper	1.20
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Western Union Telegraph company.....	1.47
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United States Express company.....	.74
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E. H. Hunter, postage	40.16
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Total	238 02
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Paid by State warrant No. 5221.

SPECIAL EXPENSE ACCOUNT.

Dr. R. E. Conniff, attending Detroit meeting.....	57.43
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Paid by State warrant No. 4975.

Dr. H. Matthey, attending Detroit meeting.....	45.80
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Paid by State warrant No. 4976.

CURRENT EXPENSES FOR OCTOBER, 1898.

J. F. Kennedy, Secretary	\$ 100.00
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Margeret S. Schoonover, stenographer.....	50.00
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F. R. Conaway—

6,000 <i>Bulletins</i>	\$ 27.45
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2,000 envelopes.....	2.75
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Total	30.20
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Iowa Telephone company50
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L. Young, binding <i>Bulletins</i>	9.00
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Total	189.70
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Paid by State warrant No. 5894.

RECAPITULATION.

August Board meeting	\$ 191.83
August expenses	248 00
September expenses	238.02
October expenses	292.93
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Total	\$ 970.78

On motion, the Board adjourned to meet at the call of the President.

DECEMBER MEETING, 1898—(SPECIAL.)

The State Board of Health met in special session at its office in the capitol building, December 28th, and was called to order by the President, Dr. R. E. Conniff.

All the members were present except the Attorney-General.

The reading of the minutes and the Secretary's report was dispensed with.

NATIONAL QUARANTINE CONVENTION.

Dr. Conniff made the following report, which was accepted, adopted, and the Secretary was directed to publish it in the *Health Bulletin*, and to send a copy to each representative from Iowa in the National Congress:

Iowa State Board of Health:

GENTLEMEN—I have the honor to report that by the unanimous voice of this Board and appointment of His Excellency, Governor Shaw, I attended the National Quarantine Convention October 17th, 18th and 19th, at Memphis, Tenn., representing the commercial interests of Iowa in a general way, and, through your commission, her sanitary interests in particular.

The convention was composed of some two hundred delegates from State Boards of Health, sanitary bodies, transportation companies, railroad lines, commercial associations, and the Marine hospital service.

The Commercial Association of the city of Memphis, under whose call the convention assembled, had made every possible provision for the comfort of the delegates. The beautiful and commodious hall in which the convention met was profusely decorated with the National colors and flags bearing the names of the States of the Union.

The Mayor of the city, in his address of welcome, reminded the convention that it was called to consider a question of the greatest importance, not only involving the commercial welfare of a large portion of the United States, but the lives and health of its people as well. He expressed his pleasure in seeing representatives from so many Northern and Eastern states, who, by their presence, indicated a willingness to assist their less fortunate brethren of the South.

His welcome was most cordial and his suggestion well received. Gen Luke E. Wright, of Tennessee, was made permanent chairman, and in a stirring address dwelt on the great importance of the movement contemplated in securing more equitable and uniform sanitary regulations, and strongly urged the necessity of the National Government assuming control in these matters, if the growing commerce of the South is to be saved from utter ruin.

An encouraging and hopeful indication was in the great interest manifested, not only by the medical men, but by the business men of all the Southern states represented in the convention.

A Committee on Resolutions was appointed, consisting of one member from each State, to receive the suggestions offered and report back to the Convention such resolutions as best embodied the consensus of opinions of the delegates.

There were a number of very able and thoughtfully prepared papers read by some of the foremost men in the field of sanitary science, on the necessity and means of dealing with contagious disease. One of the best of these was by the late Dr. John B. Hamilton, of Chicago. The unanimity of sentiment, particularly from the Southern delegates, in regard to National control, was indeed remarkable. They all, I think, without exception, favored turning the matter over to the National government, or rather, making the National government the head of a well-organized sanitary scheme that would afford protection to the lives and property interests of her citizens against a pestilence worse than war, which annually awakened the greatest apprehension in the States of the South. It was argued, and I think the point well taken, that the Federal Government owed it to her citizens to afford protection from a scourge which science has proven to be clearly preventable.

President McKinley sent a message expressing his approval of the movement and pledging his hearty support. Medical associations and sanitary bodies have long recognized the necessity and importance of some such movement, but never until now have they been able to interest the commercial world in the righteousness of strict and painstaking sanitation.

The time seems indeed opportune, for with the widespread interest in and out of the medical profession, the governmental censorship of the Antilles, the birthplace of the exotic yellow fever, which is such a scourge in the Southern states, makes it more easily controlled. There are many reasons why the work would be better done under federal control than it can possibly be done through the efforts of the State Board of Health. Uniform and equitable regulation from a national head whose branches should ramify every state, county and municipality of the Union. I think no better regulated system can be found in any state of our Union than we have in Iowa, and it is our system extended to the national government that will best and most effectually limit and control the spread of infectious and contagious disease. The completeness of such a system reaching from township organizations to the government at Washington, would be one of the best reasons for its inauguration. Then, again, greater security would be felt by all our people, and panics, which result in the rapid spread of the diseases, averted. There would be greater respect for, and more attention given, national regulation than local regulation, if for no other reason than punishment for violation would be more sure to follow. Then, again, it

would lessen the probability of local authorities suppressing the facts regarding contagious diseases, for fear of injuring local interests, and it would give the conscientious sanitarian opportunity to perform his duty without meeting with opposition, and perhaps censure, from those he is striving to serve. Time will not permit me to enter into any extended argument on this subject. I will only say, without some such scheme we will never be able to successfully combat contagious disease.

The committee on resolutions, after deliberating the greater part of two days, and considering carefully every suggestion offered, reported back to the convention the following resolutions, which, after a very animated debate, were almost unanimously adopted, and which go much farther than dealing with quarantine alone:

The committee on resolutions, after careful consideration of the many valuable resolutions offered by the various members of the convention, have decided upon the following, as embodying the ideas expressed in the majority of the said resolutions:

That for the purpose of protecting and improving the general health of the people of the United States, co-ordinating and harmonizing the action of the State and national sanitary authorities; framing regulations for the treatment of infected vessels and material at all infected or suspected foreign ports of shipment; preventing unnecessary interference with commerce, the United States mail, or through traffic by land or water, and for adopting a uniform system of quarantine for all ports in this country, be it resolved,

First.—That there be established on a broad and comprehensive basis a National Bureau of Public Health in the department of the treasury of the United States, that the administration of all the public health functions now exercised by authority of the United States, be placed in the charge of this bureau.

Second.—That the sanitary authorities and commercial interests of the several states of the Union be brought into immediate relations with the bureau, and be given a due share in the power and responsibilities of the central board through the agency of an advisory council, consisting of one member from each, to be appointed by the authorities of the several states.

In addition, the Board unanimously adopted the following preamble and resolution introduced by Dr. Conniff, and the Secretary was directed to send a copy of the same personally addressed to each senator and representative in the national Congress from Iowa:

WHEREAS, There is now before the National Congress a measure for the establishment of a National Bureau of Public Health, and for the establishment of equitable and uniform sanitary regulations, and

WHEREAS, The State Board of Health of the State of Iowa is in hearty sympathy with the movement to restrict and control epidemic, contagious and infectious diseases, therefore, be it

Resolved, That this Board of Health request the support of our senators and representatives at Washington in enacting the same into law, believing it to be of vital importance, not only to the lives and health of our people, but to our commercial interests as well.

NATIONAL PURE FOOD AND DRUG CONGRESS.

A communication was read urging the Board to send a delegate to the National Pure Food and Drug Congress to be held in Washington, D. C., January 18, 1899. The Secretary was duly elected such delegate.

SPECIAL DISINTERMENT PERMITS.

The following applications for special disinterment permits were presented by the Secretary:

Cora Lynda Appleton, *scarlet fever*, to be removed by private conveyance from a private cemetery to Oak Hill cemetery, in the city of Tama.

Alice Dorman, *croup*, by hand from one lot to another in the Manchester cemetery.

Infant of J. W. Holland, *croup*, from one lot to another in St. Joseph cemetery, Iowa City.

These applications were granted and the Secretary directed to issue them, subject to the conditions imposed in such cases.

SMALLPOX AT PERCIVAL.

The Secretary reported that the local board of health of Percival was very solicitous that some member of the State Board of Health be sent to them to assist in quarantining against Nebraska City, where smallpox exists, and whence it has spread to Percival. Dr. McKlveen was delegated to go and to report his expenses to the Secretary for payment. The Secretary was also directed to pay Dr. McKlveen \$7.50 for expenses incurred in visiting Lacona and assisting in preventive measures against smallpox.

On motion, Board adjourned to meet February 23d, unless sooner convened by the President.

FEBRUARY MEETING, 1899.

The State Board of Health convened in regular quarterly session February 23d, and was called to order by President Conniff.

There were present, Conniff, Shrader, Guilbert, Bancroft, Gibson, Matthey, McKlveen, and Dickinson.

The minutes of the November and December meetings were read and approved, and the Secretary read his report for the quarter ending January 31st, which was received and considered *seriatim*.

Respecting infectious diseases, especially smallpox, the Secretary reported as follows:

Perhaps the most notable occurrences during the quarter have been the outbreaks of smallpox at so many points in Iowa. There has never, at any time in the history of the Board, been such a general prevalence of this disease in the State. The first report we had came from Hamburg and soon after from Percival. Up to the present time there have been reported to this office, definitely, the following respecting smallpox: Exira, 1 case; Audubon, 2; Livingston, 2, Lacona, 4; West Point, 1; Percival, 17; Clio, 1; Seymour, 6; Genoa, 1; Milo, 6; Hamburg, 12; in all, 53 cases. At Seymour one death was reported and one at Genoa. These are all the deaths so far that have been reported to this office. Dr. McKlveen, in one of his reports, speaks of the disease at McPaul and Kent. At some of the points where one case is reported an indefinite statement was made that there were several other cases in the country. It is my intention, as soon as the disease subsides, to get full and complete reports from every section of the State where it has been present. All these cases were reported as having contracted the disease from exposure either at Nebraska City or Omaha. Notwithstanding the confirmation of the diagnosis of this disease, and the fact that all these cases were, with the exception of three or four, traced to Nebraska City, yet the health officers of Nebraska City have all along, and do yet, so far as I know, persist in declaring that there has not been, at any time a single case of smallpox in that place. Dr. S. R. Towne, of Omaha, was sent by the Nebraska State Board of Health to Nebraska City to make a personal investigation, and he did not hesitate to state that the infection that they were having there, and were calling chicken pox, was smallpox, and he took the best measures and precautions he could to prevent its spread, in opposition to the local health officers, and to the influence of one of the leading newspapers of Nebraska City.

It is highly creditable to the local health officers of Iowa, and to the Iowa physicians, who were called to see these cases, that the true character of the disease was so promptly recognized, and that such prompt and efficient measures were taken to prevent its spread. It is a fact, also worthy of notice, that in scarcely any of the cases did it extend beyond the family originally attacked.

There has been rather an increased number of cases of diphtheria and scarlet fever, and the mortuary reports from a very few of the cities in Iowa, as published in the February *Bulletin*, show thirty-two deaths from la grippe, which was the largest mortality from any one disease in the State.

DISINTERMENT PERMITS.

The Secretary reported that during the quarter eighty-eight disinterment permits had been issued, nine of which were "special," and one was refused. At this meeting three additional applications for special permits were presented, and granted—two dead from diphtheria, to be removed from one lot to another in the same cemetery; and one from croup, to be

removed by private conveyance from one cemetery to another in the same township.

[NOTE.—These “special” permits are granted under the following specified conditions, where death has occurred from certain infectious diseases:

1. That the disinterment is for the purpose of reinterment in another part of the same cemetery, or in a cemetery nearly contiguous.
2. That the removal shall not be by any public conveyance.
3. That the removal shall be done at an hour when there is the least possible exposure of other persons.
4. That no children shall be present, and only such persons as are actually necessary.
5. That the coffin shall not be opened.
6. That the sexton and all other persons engaged in such removal shall immediately thereafter change their clothing and properly disinfect or burn the same, and shall thoroughly disinfect their hands, head and face.
7. That this permit shall be approved by the local board of health of the city, town, or township, where the body has been interred.—SECRETARY.]

COMMUNICATIONS.

The Committee on Communications, Dr. Guilbert, reported as follows:

First.—Conference of State and Provincial Boards of Health of North America—Dr. J. N. Hurty, Secretary of the conference, announces the date and place of the next meeting and asks the Board for suggestions as to program, etc. The committee suggests the following queries:

(a) “What, if any, have been the acts of different legislatures confirmatory of, or in extension of, the powers of the various State Boards of Health?”

(b) “What, if any, have been the acts of the State Boards themselves in the direction of carrying into effect new sanitary legislation, or in modifying, enlarging or perfecting existing health board regulations?”

It is to be hoped that this year the reports from the different health boards represented in this important annual conference may be more numerous than they have been in the past. Such reports are of moment as illustrations of the fact that the philosophy of sanitary history can effectively be taught by example, and in the opinion of this State Board they should be made a leading feature in each year’s conference procedure.

The report was adopted.

Second.—Vital Statistics—The communication of Secretary Baker of the Michigan State Board of Health, certifying to us the action of this Board anent methods of collecting reliable, vital statistics for the forthcoming United States census. The proposition is one which is “timely and good,” and deserves and should have our hearty commendation and support.

Your committee recommends that President Conniff and Secretary Kennedy be and are hereby named a special committee to formulate and trans-

mit to our Senators and Representatives in Congress the proper appeal on the lines proposed by the State Board of Michigan.

The report was adopted and the following was sent by the "special committee" to each Iowa Congressman:

WHEREAS, It is eminently desirable that reliable vital statistics shall be collected by the United States census, and

WHEREAS, The system followed should be in accord with the most progressive methods observed in several of the States, the Iowa State Board of Health, at its regular meeting held in Des Moines, February 24, 1899,

Resolved, That the Representatives and Senators from Iowa be requested to lend their assistance in securing such correct vital statistics in non-registration States as may be possible.

Resolved, Furthermore, that the appointment of Dr. Cressy L. Wilbur, the present efficient Chief of the Michigan Vital Statistics, be urged as Chief Vital Statistician of the next United States census.

Third.—Menaced by Havana—The communication from the Board of Health of the City of New Orleans, La., anent the duties of the United States Government concerning the early obliteration of the yellow fever sources which Spanish incompetence has so long permitted to fester in Cuba, to the constant and very serious detriment of our Gulf States.

Your committee recommends that this matter also be referred to the President and Secretary, who shall formulate and transmit the proper appeal to our members of Congress, promptly to act on a question which involves not only innumerable human lives, but also vast commercial losses as well. The lamented Waring, had, after personal inspection, outlined the proper remedy, which ought speedily to be exhibited.

The report was adopted.

In accordance with the foregoing the following was sent to each Iowa Congressional Representative:

WHEREAS, It has been demonstrated to the satisfaction of sanitarians that Havana, owing to its filthy and unsanitary condition, is the home and breeding place of yellow fever, and

WHEREAS, It has further demonstrated that nine-tenths of the yellow fever epidemics which have devastated the United States from New England to Texas, have originated from the infection brought from that port, and

WHEREAS, As a result of the late war, fought on the grounds of humanity, the United States Government is now in full and complete charge of the city and port of Havana, and

WHEREAS, The same dictates of humanity which caused the said late war urge with greater force the protection of the people of the United States from the yellow fever infection of that city, therefore be it

Resolved, By the Iowa State Board of Health, that it is the duty of the Government of the United States to place the city and port of Havana in a sanitary condition such as to destroy the danger of infection to our shores.

Fourth.—Lintine—Your committee are of the opinion that the specimen of felting cotton fibre, in sheets, submitted to us by a reliable eastern house would fully, under the embalmer's law, comply with our regulations relat-

ing to the proper preparation for burial of the bodies of those dead from infectious diseases. The article in question is known to the trade as "Lintine."

The report was adopted.

Fifth.—Burial Permits—A communication from a Cedar river town makes mention, in vigorously proper terms, of a singular and unlawful laxity surrounding the burial of the dead in certain localities. The experience of members of the Board, in localities elsewhere in the State, is confirmatory of the proposition that it is our duty to endeavor to correct these sanitary "errors of omission and commission," to which our attention is now, for the first time, called. For the information of local health officers, who have overlooked this premise, we say, that, according to the Attorney-General of the State, the regulations of this State Board of Health have the force and power of law. Already, in a general way, the Board, in one of its numerous series of pamphlet instructions (see Form No. 120 B.), has succinctly stated the duty of local health officers and physicians and sextons, to be as follows with regard to their relation to the dead: First.—It is the duty of the attending physician, in all cases of death occurring in cities, villages or townships, to certify that fact on the proper and now well-known blanks originated by this office, stating in full the circumstances surrounding that death. Second.—The said medical certificate must be given to the undertaker, who shall present it to the clerk of the local health board, whose duty it will be to issue the proper burial permit. Third.—It is necessary that such burial permit be presented by the undertaker to the sexton of the cemetery, in which the burial is to take place, and without the exhibition of the aforesaid burial permit, the sexton must refuse, under penalty, to receive and bury the body of any decedent. The aforesaid burial permit should be carefully filed in the sexton's office, for further reference, on occasion. The physician's certificate, aforesaid, must be filed and preserved in the office of the clerk of the local board, for future reference, should occasion require it.

These rules are imperative; are of distinctive statistical importance, and are the law. They must be obeyed, under penalty—or do they conflict with the statute which now requires a return of deaths and births to be made annually to the County Auditor by the County Assessor. Your committee recommend that the Secretary of this State Board of Health, at an early day, issue and distribute to local boards and licensed embalmers a special circular embodying the points made in this report, all of which is respectfully submitted.

The report was adopted.

QUARANTINE AND DISINFECTION.

The Board took up the revision of "Form 130 B," containing rules and regulations for quarantine, disinfection, burial of the dead and disinterment.

The circular was carefully and thoroughly revised and the title was changed to circular No. 1. The Secretary was directed to have 5,000 copies printed and distributed as called for.

DELEGATES CHOSEN.

Dr. E. A. Guilbert and Dr. R. E. Conniff were chosen delegates to represent the Board at the annual meeting of the conference of State and Provincial Boards of Health of North America (Canada, United States and Mexico), to be held in Richmond, Va., May 30th and 31st.

NATIONAL PURE FOOD AND DRUG CONGRESS.

The Secretary presented his report as delegate from the Board to the meeting of the National Pure Food and Drug Congress held at Washington, D. C., January 18th to 21st. The report was read and received, and is as follows:

The above named congress was organized in Washington, D. C., at a meeting of those interested in pure food legislation, held March 2-5, 1898. At th's first meeting thirty States of the Union were represented; among the representatives were those having large commercial, producing and manufacturing interests, as well as farmers, sanitarians and scientists.

This congress unanimously adopted the following declaration as to its object:

The object of this congress is to secure suitable legislation of a national character to prevent the adulteration of food, drinks and drugs, and to secure the enforcement of such laws; to secure and promote uniformity in State legislation, and in the rulings of the State departments.

To create and maintain a high public sentiment upon these important subjects, and to uphold and sustain all public officers charged with the enforcement of such regulations.

To promote a more general intelligence concerning the injury to health and to the business interests of honest producers, manufacturers, dealers and exporters, resulting from food adulteration, and concerning the importance of proper food, pure and properly prepared, to the health of the people.

And, to this end, we ask the co-operation of every one interested in the promotion of sound public morals, and in the protection of the public health.

A number of interesting addresses were made and the congress pledged itself to the support of a bill relating to pure food and drugs and their branding and sale, which was introduced into the House by Hon. M. Brosius, of Pennsylvania, and into the Senate by Hon. C. J. Faulkner, of West Virginia.

This meeting of the congress adjourned and met for the second time in Washington, D. C., January 18th-21st, *ultimo*.

The Secretary of the State Board of Health and Mr. B. P. Norton, the Iowa State Dairy Commissioner, attended this latter session of the congress; the latter bearing a commission from the Governor, and the former also commissioned by the Governor and by the State Board of Health.

The sessions were held in the Columbian University hall and thirty-three States were represented. The sessions were interesting, instructive, harmonious and enthusiastic, as well as profitable.

They were presided over by Mr. Joseph E. Blackburn, Columbus, Ohio, who called the Congress to order at 1 P. M., January 18th. Prayer was offered by Rev. Dr. Byron Sunderland. An address of welcome was delivered by Mr. J. B. Wright, on behalf of the District of Columbia, followed by Mr. Frank Hume, President of the local Pure Food Association.

Referring to the organization of the Congress, he said: "A year ago to-day there met at the National hotel a committee of gentlemen, self-constituted if you please, who, after discussing the growing evil of food and drug adulteration, believed that the welfare of all of the people of the United States demanded that some effective effort should be made to secure the enactment of a National law which would enable honorable men to remain in business. That committee believed that a product, no matter how good, how healthful, or how appetizing or useful it might be, should be willing to sail under its proper name, and appeal to the public confidence and public patronage as an honest product and not a dishonest one. Adulteration had become so common, misbranding and substitution so universal, and the rapid increase so alarming, that it was felt that something should be done to relieve the situation and to compel the proper branding of all products that enter into human consumption.

"Under these conditions that committee issued a call for a Pure Food and Drug Congress, to assemble in the city of Washington, on the 2d day of March, 1898. The result of that call was most satisfactory. Gentlemen assembled from thirty States of this Union, and carefully considered the question presented to them, and after days of deliberation and thought united with the most remarkable unanimity in recommending the adoption of a bill for the prevention of misbranding and adulteration of food and drug products. It was a source of gratification to the local committee that their call had resulted so successfully. They felt that they had done their full duty when they surrendered to the National organization, and thus called into existence an organization which represented thirty States and nearly every important industry engaged in the production, sale and manufacture of the products upon which man depends for life and health.

"Adulteration is something which, even in its mildest forms, no honorable man can contend with. A misbranded product is not only one which does injury to the consumer, who is thus induced to part with his money for something which he has not asked for, but it prevents men who are trying to make a living, and at the same time do an honest business, from succeeding. It would be useless to dwell upon the many evils of adulteration, and especially in addressing a body of this character, which is so familiar with them, and I shall therefore not occupy your time, but simply urge you to go on in the good work in which you have done so well and have carried on up to the present time so persistently and earnestly, and, as we all trust, so successfully.

"It is not probable that a single member of this body, or any other well-informed friend of proper branding and pure food and drugs, would desire to prevent the manipulation of these products, because it would be a real injury.

"Admixtures which are not detrimental to health are often of great benefit. Many proprietary products are among the best that are sold, but, while admitting this, no reason exists that such products, good, bad or indifferent, should be misbranded, and this is the great matter, as I understand it, that this Congress has in view, and I most heartily trust that you will continue your good work until you have not only seen the lawmakers of our Nation place upon the statutes laws to remedy the existing evils, but until the States enact uniform laws and we see that they are properly executed, this movement should spread throughout this great Nation, not only into the States, but into every locality, until men who are engaged in illegitimate trade and fraudulent practices are made to understand that Othello's occupation has passed away."

President Blackburn followed with his annual address, which was devoted largely to an advocacy of the Brosius-Faulkner bill now pending in Congress.

The bill referred to is "S. 4144," and is entitled "A bill for preventing the adulteration, misbranding, and imitat'on of foods, beverages, candies, drugs and condiments in the District of Columbia and the territories, and for regulating interstate traffic therein, and for other purposes."

The bill provides that for the purposes of the act, "The Secretary of Agriculture shall organize in the chemical division of the Department of Agriculture a food, beverage, and drug section, and make rules governing the same to carry out the provisions of this act, under direction of the Chief Chemist, whose duty it shall be to procure, from time to time, under rules and regulations to be prescribed by the Secretary of Agriculture, and analyze, or cause to be analyzed or examined, microscopically or otherwise, samples of foods, beverages, condiments or drugs offered for sale in the District of Columbia, or in any State or Territory other than where manufactured, or from a foreign country provided the same be in original or unbroken packages."

The next speaker was Hon. James Wilson, the able Secretary of the Department of Agriculture, a man whom Iowa loves to honor and see honored. He said that he believed the law-making powers were coming each day nearer to the position taken by the convention. He spoke of the importance of guarding the purity of our food, and said that national legislation was needed to supplement that of the States. He went on to speak of the injury done to the commerce of the country by sending abroad impure articles of food bearing the name of American dealers. He stated that he once asked a man who had a cargo of vinegar condemned by State authorities, as not being a proper article for food, what he proposed to do.

"Oh," was the reply, "we will send it to Ireland, where they have no pure food inspection."

The Secretary went on to say that if there was a law prohibiting the placing of spurious goods on the market then such goods would not be sent abroad, to the injury of our trade interests. He spoke earnestly and vigorously against the continuance of a policy that allows our honest markets abroad to be destroyed by permitting spurious goods with the American labels to be sent to foreign countries.

The Secretary pointed out what, in his opinion, would be the main obstacle to the passage of the legislation favored by the convention, and

that was the conservative feeling in this country against placing any restrictions on commerce. The proposed legislation, he said, was an exception, as it was demanded by the entire people. In closing, he assured the delegates of the entire sympathy of the Department of Agriculture with the objects of the convention.

Secretary Wilson was followed by Mr. J. H. Brigham, Assistant Secretary of Agriculture, who spoke of the change that had taken place in the quality of food nowadays. When he was a boy, he said, although food was not always as well prepared as it is to-day, it was pure. Now, however, adulterations meant large gains to the dealers, and it was difficult to secure pure food supplies.

The Congress was disappointed on the second day in not hearing Senator Faulkner, of West Virginia, the patron of the food bill in the Senate, who had been called away from the city because of the death of his father-in-law.

Representative Brosius, of Pennsylvania, designated on the program as the patron of the pure food bill in the House, was introduced. In the course of a speech which was listened to with close attention, Mr. Brosius said the circumstances of the country, since their last meeting, had changed, as since then the war with Spain had been fought, and as a result, in his opinion, this country had been advanced in its history many years. He spoke of the serious responsibilities that confronted the American people in the problem of the Philippines, and expressed the hope that the people would show that they are worthy of their destiny.

He asserted that it was the duty of congress, within its constitutional limits, to provide a health environment for the public and to promote commercial integrity. He did not deny the right of American citizens to buy and consume articles of food that contained glucose, aniline dyes, acids of various kinds and other ingredients used to produce imitations of genuine articles of food, but he asserted that they ought to be able to identify such goods and to know what they are buying.

In a series of alliterations he spoke of the relations between a people's food and their folly; their meat and their morals; their digestion and their destiny. He said it was necessary to instruct the people in this matter, and to demonstrate to them how they are being injured, and then, he said, the natural inertia of the public would be overcome. He asserted that when the people of this country are in earnest they can get any legislation they demand. All that is necessary is to utter the voice that is recognized as being that of the people and the law-makers will give heed.

He paid a tribute to the farmers of the country, and said that one of the things he was thankful to providence for, was that he had been raised on a farm. He spoke of the influence the farmers had on public questions, and the important part they played in forming public opinion. He had something to say of the difficulty in forming and arousing public sentiment, and said that the first requisite was education, and then the imagination, which kindled men to a white heat with the fervor of purpose.

He expressed the opinion that such legislation was bound to come, and that in the near future. He advised that the action of the convention be united, determined and continuous, and at the present, certainly at the next, session of congress would enact a law which would put a stop on food piracies.

The committee on credentials reported that 192 delegates had registered, representing twenty state governors, twenty-two states, and sixty-eight different state and local organizations.

Shortly after 2 o'clock the convention reassembled. The afternoon was to have been devoted to a program of addresses, but after the first of these had been made, it was decided to postpone the rest until some of the business before the congress had been transacted. Dr. Harvey W. Wiley, of the Department of Agriculture, was the first speaker, his subject being "The Ethics of Pure Food." Dr. Wiley spoke extemporaneously, in his usual pleasant and witty way.

"The first thing in every household," he said, "is to have something to eat, and the second is to have it attractively prepared. The cause of a great deal of our domestic infelicity is bad cooking. Our women are going to college and learning about everything except domesticity. Our schools ought to pay more attention to domestic science, and especially to that of the kitchen. In the study of the ethics of pure food we find that cooking takes a prominent place, but the cook must have good materials to start with. Now, while the great majority of foods are pure, yet there is probably no one product which has not at some time and somewhere been falsified. We owe a moral duty to the producer and consumer. Pure food legislation is not necessarily in any way restrictive. What the ethics of pure food demand is that when anybody purchases an article in good faith the law should protect him in getting what he asks for. Things should be sold for what they are. We want a law that will not injure or restrict any honest business."

A report was then made by Prof. J. H. Beal, of Ohio, on uniformity in regard to the regulations concerning adulterated foods. He said that the committee thought the proposition embraced three things—uniformity in the methods of analysis, uniformity in the pure food laws of the several States and of the United States, and uniformity in the methods of marking the different products concerned. These three aspects of the question had been put in the hands of three sub-committees, of which he would make the report for the sub-committee on uniform State legislation. Three recommendations were made—the enactment by Congress of a law concerning the general subject of adulteration, the publication of an authoritative compilation of the State laws on this subject with the decisions of the courts upon them, and the draught of a general law on adulteration to be prepared by a committee appointed by the president of the association and the chief chemist of the Agricultural Department.

One of the most interesting addresses of the congress was delivered by Hon. H. D. Perky, of Worcester, Mass., on "Naturally Organized Food Makes Possible Natural Conditions." He is the president of the Oread Institute, one of the largest cooking schools in the world. He emphasized the importance of proper food as well as pure food, and that the ability to select food adapted by nature for the development of every part of the body and its proper preparation were essential to the development of natural healthy conditions.

The following brief extract suggests the trend of his thought and the vigor and terseness with which he presented it:

"I desire to call the attention of the congress briefly to the proposition that while many speeches have been made by eminent men, legislators, statesmen, and scientific gentlemen before this congress, that all that was said seemed to express a desire that a law be passed which in its operation should make men honest. While I approve most heartily of the provisions of the proposed law, which shall compel manufacturers to properly label their manufactures according to the contents of the package, I was rather surprised that so intelligent a body of men as composed the congress had not in some way given expression to their views as to what is proper food for man. All seem to be satisfied with pure food, but pure food is not always proper food, whereas proper food is always pure food. I suggest to the committee that the report setting forth the objects of the congress shall include the words proper food. A dog, as well as a man, may starve on pure food, but never on proper food. Proper food is made from naturally organized food products. Naturally organized food products, in the process of growth, extract from the earth and the air the properties and compound them in nature's laboratory, perfectly suited as a building material for the structure of man." Continuing, Mr. Perky said: "That there was some leading, general cause why almost everybody was sick, why 25 per cent of the children of the country die under one year of age, and 35 per cent under five years of age; why 95 per cent of the people who engage in business fail; why the country is strewn with tramps and drunkards, the jails and penitentiaries and asylums and almshouses are full. I suggest that the cause for these things is mainly because the people of this country do not understand the proposition that naturally organized food products make possible natural conditions and that there is no other way."

Senator William E. Mason, of Illinois, had been announced for an address at 10 A. M., Friday. He was present as per program, but the members of the Congress came in so late that he left for awhile to attend to some business.

Upon his return he was introduced, and said that he had been employing the time since his first visit to the hall in visiting the departments, and he now had only a few minutes to remain. There was so much to say, and such a short time to say it in that he sympathized with the boy who, as he was confronted with a barrel of sugar, sighed, "Oh, for a thousand tongues." However, the Senator proceeded to make a very effective speech which bore on some of the practical features of the contest that is being waged by the pure food advocates.

He said if manufacturers and others were obliged to sell goods for what they are, it would be a protection to the great mass of people who are too ignorant or too busy to know about such deceptions, and at the same time it would give protection to honest manufacturers. He advised organization, and said that the enemies of the cause were organized. Whenever it is proposed, he said, to sell goods for what they are, at once all sorts of influences are brought to bear in opposition. He said a man who poisons the community for gain is not above attempting to buy members of State legislatures and of Congress. He referred to the trusts that controlled the necessities of life, and the interest of those combinations of capital in the continuance of the use of adulterations. He urged that those in favor of pure food legislation should stand by the legislators who have aroused the hostility of such influences.

Senator Mason went on to say that there had been a good deal of talk about this country civilizing the world; but this countenancing of adulterations in food was, so to speak, a beam in the National eye, and, in the opinion of the speaker, we should aim to get it out before we strain ourselves to remove beams from the eyes of people thousands of miles away. He said that National legislation in the internal revenue office had been successful, and he cited as an instance the oleomargarine law. He referred to his efforts to secure a law in regard to flour, and the success which has followed, and in conclusion, advised a modification of the old motto so that it would read "they should hustle while they wait." He added that if they could not storm the entire line they might take a picket post.

The address, though brief, was earnest and practical, and elicited spirited applause and warm commendations.

At 2:30 P. M., Friday, President McKinley honored the Congress with a "reception," which was largely attended and very enjoyable.

The Committee on Organization reported in favor of a permanent organization, and submitted a constitution and by-laws, which were adopted. They also submitted a list of officers for the ensuing year, consisting of a President, one Vice-President from each State and from the District of Columbia, and one from the Government.

Joseph E. Blackburn, Columbus, Ohio, was re-elected President; Frank Hume, District of Columbia, First Vice-President; A. J. Wedderburn, Washington, D. C., Corresponding Secretary; Franklin Dye, Trenton, N. J., Recording Secretary, and R. N. Harper, Washington, D. C., Treasurer. A Vice President for each State was appointed as recommended by the committee. There was also appointed an executive, finance, legislative and advisory committee.

The date of the next meeting was not determined. The place will doubtless be Washington, D. C.

At the evening session Mr. Paul V. Flynn, of Newark, N. J., read a paper upon "The Spirit of the Age and Pure Food Legislation." There is only room for the following extract, which must be appreciated and applauded by the farmers of Iowa:

"Agricultural industries are the fountain head of all national prosperity. Cripple them, and all other enterprises suffer. Destroy them, and universal ruin would follow. How rarely does this subject receive that consideration from the masses which its importance should ever command. Human life is taken in self-defense, and the enlightened civilization of the Nineteenth century will justify the act. But even were the act not justifiable, what is one individual life or many, compared with the direful results that would arise from sapping the very heart's blood of the Nation itself? The agricultural classes suffer deeply from those abuses which the proposed legislation, in which this Congress is interested, would strike down. How can the farmer live and prosper when the fruits of the field and the products of the dairy are adulterated and imitated, and the adulterations and imitations misbranded and sold in competition with his own? Is not such competition unfair? Is it not unjust? Is it not violative of the 'Spirit of the Age?'"

The foregoing briefly represents the transactions of the second session of the National Pure Food and Drug Congress. An effort will be made not only to secure the passage of the Brosius-Faulkner bill, but to secure, so far as possible, uniform legislation by all the States.

To secure this beneficent result the powerful influence of the public press is earnestly invoked to aid in building up public opinion in favor of such legislation in Iowa.

FINANCIAL.

The Secretary submitted the following financial report, which was received, audited, and reported correct in every particular:

Board meeting November 5, 1898.

MEMBERS' EXPENSE ACCOUNT.

J. A. Scroggs.....	\$ 26 56
R. E. Conniff	34.60
E. A. Gullbert.....	32.10
W. Bancroft.....	26.66
J. C. Shrader.....	23.86
H. Matthey.....	29.35
J. I. Gibson.....	26.68
J. A. McKlveen.....	19.92
Total	\$ 219.73

Paid by State warrant No. 5958.

SPECIAL EXPENSES FOR NOVEMBER.

Dr. J. C. Shrader, attending meeting at Ottawa.....	99.83
Paid by State warrant No. 5956.	
Dr. J. I. Gibson, attending Ottawa meeting.....	129.24
Paid by State warrant No. 5957.	

CURRENT EXPENSES FOR NOVEMBER.

J. F. Kennedy, Secretary.....	\$ 100.00
Margaret S. Schoonover, Stenographer.....	50.00
F. R. Conaway—	
6,000 <i>Bulletins</i>	\$ 27.45
1,000 circulars No. 6.....	16.53
	<u>43.98</u>
L. Young—	
Binding <i>Bulletin</i>	\$ 9.00
Binding circular No. 6	1.50
	<u>10.50</u>
D. Appleton & Company, Popular Science	5.00
Conference S. and P. B. of H.	15.00
Total	\$ 224.48

Paid by State warrant No. 6386.

Board meeting December 29, 1898.

FEBRUARY MEETING, 1899.

83

MEMBERS' EXPENSE ACCOUNT.

E. A. Guilbert	\$ 24.40	
R. E. Conniff	24.00	
W. Bancroft	21.56	
J. C. Shrader	18.76	
H. Matthey	22.25	
J. A. Scroggs	22.06	
Warren Dickinson	5.50	
J. I. Gibson	20.58	
J. A. McKlveen	10.64	
	<hr/>	\$ 169.75

Paid by State warrant No. 6781.

SPECIAL EXPENSE ACCOUNT.

R. E. Conniff, attending Memphis meeting	\$ 58.35
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Paid by State warrant No. 6773.

CURRENT EXPENSES FOR DECEMBER.

J. F. Kennedy, Secretary		100.00
Margaret S. Schoonover, Stenographer		50.00
F. R. Conaway—		
6,000 <i>Bulletins</i>	\$ 27.45	
1,000 circulars	3.75	
	<hr/>	\$ 31.20
F. R. Conaway—		
2,000 transit permits	\$ 22.50	
1,000 transit permits	7.50	
	<hr/>	30.00
L. Young, bi ding <i>Bulletin</i>		9.00
L. Schooler, postage		8.00
Smith Pamer company, 1 dozen carbons .....		.50
Babyhood Publishing company		1.00
Western Union Telegraph company		1.35
Adams Express company .....		.25
American Express company .....		.25
Carter & Hussey—		
1 gross pencils	\$ 4.50	
1 quart ink .....	.65	
	<hr/>	5.15
	<hr/>	
Total		\$ 238.70

Paid by State warrant No. 6976.

CURRENT EXPENSES FOR JANUARY, 1899.

J. F. Kennedy, Secretary	\$ 100.00
Margaret S. Schoonover, Stenographer	50.00
F. R. Conaway, printing <i>Bulletin</i>	27.45
L. Young, binding <i>Bulletin</i>	9 00
J. A. McKlveen, investigating smallpox	31.94

Drysedale & Hall—

1 model dater	\$ 1.50	
1 pad .....	.15	
1 bottle ink .....	.20	
	—————	\$ 1.85
Orson Luin, books on hygiene		14.00
Western Union Telegraph company .....		.79
	—————	
Total		\$ 235.03

Paid by State warrant No. 7585.

SPECIAL EXPENSE ACCOUNT.

J. F. Kennedy, attending Washington meeting..... 87.30

Paid by State warrant No. 7584.

RECAPITULATION.

Board meeting, November	\$ 219.73	
November expenses	453.55	
Board meeting, December	169.75	
December expenses	297.05	
January expenses (1899)	322.33	
	—————	
Total		\$ 1,462.41
Expended October, 1898		189.70
		—————
Expended for fiscal year beginning October 1, 1898.		\$ 1,652.11

Board adjourned to meet first Wednesday in May.

BOARD MEETING—MAY, 1899.

The Iowa State Board of Health convened in annual session at the office of the Secretary May 3d, and was called to order, in the absence of the President, by Dr. J. I. Gibson, who was elected President *pro tem*.

There were present Drs. Gibson, Guilbert, Bancroft, Scroggs, Matthey, Shrader and Warren Dickinson, C. E., and later, Conniff and McKlveen.

The minutes of last meeting were read and approved.

The report of the Secretary for the quarter ending April 30th was read and referred to the respective standing committee and considered later *seriatim*.

Dr. Shrader presented a bill amounting to \$8.90 for expenses incurred in visiting Mechanicsville, Lisbon and Wellman, and investigating smallpox. The bill was allowed and ordered paid.

SPECIAL DISINTERMENT PERMITS.

Special permits were granted for the disinterment of the following persons:

Edith Stone, Waverly; scarlet fever, to another lot in same cemetery.

Fred Ballard, Dubuque; membranous croup, to another lot in same cemetery.

Ruth Ballard, Dubuque; membranous croup, to another lot in same cemetery.

Bessie Ballard, Dubuque; diphtheria, to another lot in same cemetery.

Elizabeth Evans, Key West; scarlet fever, removed to another lot in same cemetery.

Margaret Evans, Key West; croup, removed to another lot in same cemetery.

The disinterments were permitted under the following specified conditions, which must be observed in all such cases:

First.—That the disinterment is for the purpose of re-interment in another part of the same cemetery, or in a cemetery nearly contiguous.

Second.—That the removal shall not be made by any public conveyance.

Third.—That the removal shall be done at an hour when there is the least public exposure of other persons.

Fourth.—That no children shall be present, and only such persons as are actually necessary.

Fifth.—That the coffin shall not be opened.

Sixth.—That the sexton and all other persons engaged in such removal shall immediately thereafter change their clothing and properly disinfect, or burn the same, and shall thoroughly disinfect their hands, head and face.

Seventh.—That this permit shall be approved by the local board of health of the city or township in which the body is interred.

OFFICERS ELECTED.

Dr. J. A. Scroggs, of Keokuk, was unanimously elected President of the Board for the ensuing year, and Dr. J. F. Kennedy was in the same manner re-elected Secretary.

Prof. S. R. Macy, of Highland Park College, Des Moines, was re-elected Chemist to the Board, and Dr. Eli Grimes, of Des Moines, was re-elected Bacteriologist.

Josiah Forrest Kennedy was continued as editor of the *Bulletin*.

President-elect Scroggs was elected an additional delegate to the Conference to be held at Richmond, Va., May 30th and 31st.

LINSEED OIL.

Professor Macy and H. M. Pickell reported the results of a number of tests of alleged pure linseed oil, eight samples of

which were reported adulterated. The report was received and referred to the Committee on Oil Inspection, Matthey and Gibson, who subsequently reported as follows:

Your Committee, to whom was referred the special report of Professor Macy, setting forth his finding in a number of inspections of linseed oil, beg leave to report the following:

While a number of samples have been found to be adulterated we do not recommend that a number of legal prosecutions be instituted, but rather that the Secretary be instructed to notify the manufacturers whose products have been found adulterated, of the findings of this Board, and advised that upon a second similar finding prosecutions will be instituted.

The report of the committee was received and adopted.

MEMORIAL.

The following memorial was presented and adopted unanimously by a rising vote:

"God's finger touched her and she slept."

* * * * *

Inasmuch as the Iowa State Board of Health is composed of members who are bound by endearing ties, each to each and all to each, they learn with sincerest sorrow that their colleague, Dr. J. C. Shrader, has recently sustained a pathetic loss in the death of an only daughter. Some of us

"Know what sore afflictions mean
For we have felt the same,"

And we can more promptly comprehend the heartache he must feel; a heartache all of us deplore and would mitigate if we could. We proffer him our affectionate sympathy, and we voice the hope that in his time of trouble "the Lord may bless him and keep him, lifting up the light of His countenance upon him," in His own good time, "giving him peace."

GUILBERT.

INFECTIOUS DISEASES.

The Secretary reported the following respecting infectious diseases:

There have been comparatively few reports of outbreaks of diphtheria and scarlet fever during the quarter. Measles have been rather more prevalent than usual and several deaths have been reported.

There have been reports of cerebro-spinal meningitis at Decorah, Oasian, Slater, Davenport and Chariton. The following interesting report from Dr. McKlveen shows the extent of the disease in Clarke county. In all these places parties have written here as well as from other places, asking what action, if any, the State Board has taken in regard to this disease; whether quarantine has been required or what preventive measures recommended. In the April number of the *Bulletin*, in view of these inquiries, I presented an article upon cerebro-spinal meningitis, especially calling attention to

matters of inquiry in regard to the character of the disease as suggested by the Michigan State Board of Health.

There was an outbreak of smallpox in Greenfield township, Jones county, that has created a state-wide interest because of the nature of the disease not being promptly recognized and no preventive measures being taken until after the death of the patient.

I present herewith a couple of interesting reports from Dr. Shrader, who visited the localities personally and assisted in such restrictive measures as were adopted. A letter from Dr. Burd, of Lisbon, states that there are no cases in Linn county; that the Zimmerman girls, as soon as they were found to be getting sick at Mt. Vernon, were taken to their home in Greenfield township, and that all who were in any way exposed to them at Mt. Vernon had been quarantined and vaccinated and that as a result there have been no other cases.

There are at present three cases in Cedar county. One the undertaker of Mechanicsville, who took care of the remains of young Zimmerman who died, and two in Pioneer township, north of Mechanicsville. All these cases were from exposure to the Zimmerman family.

The hope is expressed by physicians, and others report from Linn, Jones and Cedar counties, that no other cases will occur. There was also one case reported as occurring at Wellman, in Washington county. This case was also visited by Dr. Shrader, and I present herewith his report of the same. No other case has occurred at this point.

Dr. McKlveen was called to visit some cases at Elkhorn and Kimballton, and I herewith take pleasure in presenting his report.

There have been reported to this office, from several points in the State, cases of rabies, where stock has been bitten and where people have been terrorized, and inquiries have been made as to what, if any, action has ever been taken by this Board in the way of preventing the spread of this disease. I would respectfully suggest that some official expression be made by your honorable body, either in a special circular or that some expression be incorporated in the pamphlet issued by this Board upon contagious diseases among domestic animals. The latter plan would be the better, for it would seem as if this would be the proper channel by which to convey the information desired.

The Board unanimously adopted the following respecting smallpox, as recommended by the Committee on Contagious Diseases, Doctors Scroggs and Shrader:

WHEREAS, Smallpox has appeared at several points in our State and is very prevalent in a number of States of this Union, and

WHEREAS, It prevails among the troops that are being transported at intervals across our State; two regiments of our own brave boys soon to be returned from points where this dread disease is prevalent, be it

Resolved, That all local boards of health be earnestly urged to immediately require a general vaccination and revaccination of the people under their jurisdiction.

Doctor Conniff vacated the chair of the President and Doctor Scroggs entered upon his duties and announced the following standing committees:

STANDING COMMITTEES.

Auditing—Dickinson, Matthey.
 Communications—Gullbert.
 Contagious Diseases—Shrader, Matthey.
 Corpses—Bancroft.
 Diseases of Animals and Veterinary Sanitation—Gibson.
 Disinfection—Grimes.
 Food and Water—Conniff, McKlveen, Matthey.
 Legislation and Legal Enforcement—Remley, Conniff.
 Library and printing—McKlveen.
 Oil Inspection—Matthey, Gibson.
 Plumbing and Ventilation—Dickinson, Shrader.
 Publications and Rules—Remley, Bancroft.
 Schools—McKlveen, Conniff, Gullbert.
 Sanitary Analysis—Macy.

CEREBRO-SPINAL MENINGITIS.

The Secretary called attention to several outbreaks of cerebro-spinal meningitis, of unusually severe type in several localities of the State, and suggested that some official utterance be given by the Board as to what, if any, preventive measures should be observed by local boards of health. Owing to the lateness of the hour such action was deferred until the next meeting.

FINANCIAL.

The Secretary presented the following financial statement for the quarter ending April 30, 1899:

Board meeting February 24, 1899.

MEMBERS' EXPENSE ACCOUNT.

W. Bancroft.....	\$ 25.96	
J. A. McKlveen.....	19.57	
J. C. Shrader.....	24.26	
H. Matthey.....	28.50	
J. I. Gibson.....	26.58	
E. A. Gullbert.....	31.40	
R. E. Conniff.....	32.50	
W. Dickinson.....	6.60	
	<hr/>	
Total		\$ 195.37

Paid by State warrant No. 7745.

CURRENT EXPENSES FOR FEBRUARY.

J. F. Kennedy, Secretary.....	\$ 100.00	
Margaret S. Schoonover, stenographer.....	50 00	
F. R. Conaway—		
Printing <i>Bulletin</i>	\$ 27.45	
2,000 mortuary reports.....	4.50	
	<hr/>	31.95
L. Young, binding <i>Bulletins</i>	9.00	
Comp. medicine.....	3 00	
The Sanitarian.....	4.00	
Popular Science News.....	2.00	
Adams Express company.....	1.45	
Wells Fargo & Co., express.....	.85	
Western Union Telegraph company.....	.81	
J. A. Scrogge, investigating smallpox.....	10 80	
J. A. McKlveen, investigating smallpox.....	4 57	
	<hr/>	
Total		\$ 213.43
Paid by State warrant No. 8028.		

CURRENT EXPENSES FOR MARCH.

J. F. Kennedy, Secretary.....	\$ 100.00	
Margaret S. Schoonover, stenographer.....	50.00	
F. R. Conaway—		
6,000 <i>Bulletins</i>	\$ 27.45	
5,000 circulars.....	47.07	
1,125 envelopes.....	2.75	
2,000 disinterment applications.....	8.25	
	<hr/>	85.52
L. Young—		
Binding <i>Bulletins</i>	\$ 9.00	
5,000 circulars.....	22.00	
	<hr/>	31.00
L. Schooler, postage	30.00	
Munn & Co., <i>Scientific American</i>	5.00	
<i>Domestic Engineering</i>	2.00	
Western Union Telegraph .....	.66	
	<hr/>	
Total		\$ 304.18
Paid by State warrant No. 8407		

CURRENT EXPENSES FOR APRIL.

J. F. Kennedy, Secretary.....	\$ 100.00	
Margaret S. Schoonover, stenographer.....	50.00	
F. R. Conaway—		
6,000 <i>Bulletins</i>	\$ 27.45	
6,000 marriage returns.....	48.00	
Ruling marriage blanks.....	13.00	
	<hr/>	88.45
L. Young—		
Folding marriage returns.....	\$ 6.00	
Folding <i>Bulletins</i>	9.00	
	<hr/>	15.00

Iowa Lithograph company—

Letterheads \$ 5 00

Langan Bros.—

2 quarts mucilage \$ 1.30

1 quart writing fluid45

1.75

J. A. McKlveen, investigating smallpox 22.11

Adams Express company 1.20

Western Union Telegraph company31

American Express company28

American Veterinary Review 3.00

Total \$ 287.10

Paid by State warrant No 8356.

RECAPITULATION.

February meeting \$ 195.37

February expenses 218.43

March expenses 304.18

April expenses 287.10

Total \$1,005.08

Previously expended during fiscal year beginning October

1st 1,652.11

Total expenditures \$2,657.19

Annual appropriation \$ 5,000.00

Expended 2,657.19

*Enexpended \$ 2,342.81

The report was received and referred to the Auditing Committee, who reported as follows:

The Auditing Committee, to whom has been referred the Secretary's financial report for the quarter ending April 30th, report as follows: "We have found vouchers filed for each and every item of expenditure, and warrants drawn check with the vouchers filed."

Respectfully submitted,

WARREN DICKINSON,
H. MATTHEY.

The report was adopted and ordered placed on file.

The Board adjourned to meet the first Wednesday in August.

*The total expenditures as reported during the biennial period embraced in this report as shown by the foregoing, amount to \$3,509.12. The fiscal year, as required by the code, begins October 1st. The amount expended for the fiscal year ending September 30, 1893, was \$5,000—the amount appropriated by the code; and for the preceding fiscal year, \$1,999.93.

II.

SMALLPOX IN IOWA.

The most extensive and persistent visitation of smallpox that ever occurred in Iowa, began November 18, 1898, at Hamburg, and was reported by Dr. W. L. Bogan, the health officer. As a matter of convenience the history of its progress will be presented topically, by counties, rather than chronologically.

There are some facts that may be stated by way of preface, however, that will be found interesting by way of illustrating what has been noticed everywhere perhaps, that the ignorance or obstinacy of physicians and others is largely responsible for the extension of the disease when it once attacks any locality.

The disease came into Iowa from Nebraska City, Neb., where it had existed for several months—its presence and character being either unknown, or purposely ignored for commercial purposes.

In response to a letter written by the Secretary of this State Board of Health, Dr. D. R. Towne, respecting the presence and prevalence of the disease in Nebraska City and the failure of the health department to recognize its true character, and hence to adopt and enforce suitable measures for its restriction, says:

“You speak of this city (Nebraska City) as my residence. The Nebraska State Board of Health sent me here from Omaha, where I have served as Assistant Commissioner. Since my arrival, on December 12th, I have been at my wits' end to reduce things to order. Our hospital is over-full; no disinfection till I came, and no quarantine till about December 10th, I think, though the disease has existed since August last, and the physician on the local board of health declares to-day that there is no smallpox in the city. I found sixty-three (63) cases of smallpox, most of them very mild; many with only eight or ten papules, or less; only one fatal case. With these conditions and grumbling tax-payers I find little comfort.”

Here was the Health Physician—the medical adviser of the Board of Health of Nebraska City denying the presence of smallpox, and the press, in part, if not in whole, declaring that not a case existed in the city. Under such conditions Iowa people and Nebraska people were mingling with each other unrestrictedly and unsuspectingly until there were many exposures, and, as a result, many outbreaks at different points in the State. It will not be far from the truth to state that of the more than two hundred cases reported as having occurred in Iowa, three-fourths had their origin, primarily or secondarily, in Nebraska City. Doubtless the object in keeping the character of the disease a secret was to hold the trade of Nebraska City—regarding the commercial interests of the city as of more importance than the sanitary interests—an extravagant mistake from an economic standpoint!

But it would be unfair to charge Nebraska with all the loss of time and money, to say nothing of the suffering and death that resulted from this loathsome disease. There were health officers in our own State who had to contend with the ignorance (?) and obstinacy of local physicians who were disposed and determined to shield their patrons despite the well-directed efforts of the health authorities.

The following letter was received from a stricken district in Iowa. For reasons unnecessary to state, the names of the locality and parties interested are withheld:

JUNE 13, 1899.

J. F. Kennedy, M. D., Des Moines, Iowa:

DEAR SIR—I am compelled to come to you again for advice regarding one of our smallpox cases. Mr. Blank was taken sick May 18th; on the 22d his case was reported to us as smallpox by Dr. ———; on his report we placed a strict quarantine on the family. June 12th Dr. ——— reported the patient as fully recovered, and now we are having our hands full trying to keep the patient in the required length of time. Our city physician and myself saw the patient this morning. While he is apparently well, and has scaled off (only in the last few days), we are not disposed to release him until we hear from you. He has a family of three or four children, and while they have as yet shown no signs of the disease, we are a little anxious regarding their welfare. I want to assure you that it is a pretty hard matter for us to keep our people quarantined against the advice of Dr. ———, and I would ask you to write him and give him some of the literature you sent us. When this disease made its appearance here early in March, he withheld the facts from the local board of health until May 3d, after which time we have earnestly fought the disease, and have nearly stamped it out, and now we in turn have to fight him in order to kill the disease. While we are doing everything in our power to rid ourselves of

this scourge, he on the other hand tells the people to wait till winter, when we will have smallpox in earnest. We are not disposed to wait till winter to make our fight. We want his help now and want to meet the coming winter with a clean bill of health. Mr. Blank would not tell us what Dr. ——— told him yesterday, but he told our guard that the doctor told him to tear the placard off his gate and go out; that we had no right to keep him longer. This is the kind of help we are getting, and this is what makes our troubles all the harder to bear. The great trouble with Dr. ——— is, he has never been dictated to, even by the State Board of Health, and will not listen to your rules and regulations. He makes his laws and we are supposed to live up to them. I am satisfied (with one of his actions yesterday), that he takes no precautions, personally, to prevent the spread of this disease. Our special police handed me the report on the Blank case yesterday, which I supposed had been handed him by Dr. ———, but discovered later that the doctor had left the report with Mr. Blank, who in turn gave it to our police, whereby we two were exposed. This is hardly right, and we cannot be blamed for being a little out of patience with the doctor. Wish you would give this your attention at once.

Respectfully,

Mayor.

Upon the receipt of this communication the Secretary of the State Board of Health sent the documents referred to, and the communication, to Dr. J. C. Shrader, of Iowa City, a member of the State Board of Health, who was well acquainted with the doctor in question, and with many of the facts relating to the outbreak in the city referred to.

The following is Dr. Shrader's vigorous reply, and it is needless to say that there was no further trouble from this doctor:

IOWA CITY, Iowa, June 15, 1899.

Dr. J. F. Kennedy, Des Moines, Iowa:

MY DEAR DOCTOR—Yours of the 14th, in relation to the outbreak of smallpox, and showing how a doctor can make an ass of himself and cause a great amount of trouble to the health authorities, as well as to his professional brothers, is before me.

I read the Mayor's letter, and must say that I was very much surprised at the course pursued and the method followed out in pursuance of that stubborn and contrary course of Dr. ———. He is an ex-President of the Iowa State Medical association, an honored and as well an honorable man and physician. If this was ignorance on the Doctor's part I could excuse him, but instead it looks more like cussedness. I think the Mayor would be justified in arresting and punishing him. The moral effect would be good, and certainly the provocation is sufficient. The same course and cursed actions by a man less prominent in his profession and standing in his community would not give the health authorities one-tenth the trouble as in this case. In my opinion he should be made an example of, and be compelled to respect the law. It would have a healthy effect upon him, as

we'll as upon some others of like stubborn and cranky dispositions. He is defying the authorities on account of his age and respectability, which renders the case more aggravated.

I hope and trust that the Mayor will do his duty. The health of his town demands it, and a proper respect for law and order requires it. I return the Mayor's letter herewith.

In this particular locality the disease need not to have gotten beyond the first family attacked. As it was there were not far from a score of cases—causing an embargo upon business, great expense, distressing anxiety and much suffering.

There were a few cases where the character was not readily determined because of its mildness and no knowledge of exposure. This was no reflection upon the professional ability of the physician. There were several instances where the disease was promptly recognized and reported, and where the local health board was reluctant and hesitated to institute preventive measures such as isolation, quarantine, vaccination and disinfection.

By the time of the May (1899) meeting of the State Board of Health, there were so many points of incidence of smallpox within the State, as shown by the report of the Secretary, that the Board passed the following declaration, as recommended by the Committee on Infectious Diseases:

WHEREAS, Smallpox has appeared at several points in our State and is very prevalent in a number of states of this Union, and

WHEREAS, It prevails among the troops that are being transported at intervals across our State; two regiments of our own brave boys soon to be returned from points where this dread disease is prevalent, be it

Resolved, That all local boards of health be earnestly urged to immediately require a general vaccination and revaccination of the people under their jurisdiction.

This action by the Board was published in the *May Bulletin*, which is sent to every local board of health whether urban or rural, and with it the following communication from the Attorney-General, Hon. Milton Remley, on vaccination:

It is claimed that the compulsory vaccination is an invasion of the person of the individual. People submit to laws imposing burdens in the form of taxation, and restraints upon their conduct or action with comparative equanimity, but when the enforcement of a law touches their person, they are disposed to consider it a personal indignity. In such cases resentment and indignation often arise to the exclusion of reason and judgment. The power of the State to require all persons to be vaccinated, when the necessity therefor arises, is the same power as that exercised when whole blocks of buildings are torn down or blown up to stop the spread of a conflagration.

It is the same kind of power as that which arrests and confines an insane person, or one who, for any cause, is a menace to others. It is called the police power of the State. Public safety is the supreme law, is a maxim left us by the Romans. In times of danger to the public all things must yield to the demands of the public welfare. No one having the smallpox would be permitted to parade the populous streets, spreading contagion everywhere. If under no statute law he could be restrained, he would be restrained by force; his life even would be taken, if necessary, under the law of self-protection or public safety, which is instinctly recognized by every human being.

The power to restrain one already infected with the disease, and the power to compel one to do an act which will prevent him from becoming infected, are one and the same—only differing in degrees.

The power of State to require all persons to be vaccinated, when danger threatens, has not been directly determined by any court, to my knowledge, except in the case of *Morris v. City of Columbus*, by the Supreme Court of Georgia, which was decided a little more than a year ago. The constitutionality of the law was upheld by the court in a very able opinion, in which the principles of law are clearly stated, and the authorities are cited and reviewed. Other courts have upheld laws involving the same principle and powers, but space will not permit me to review them. It will well pay anyone interested in the subject to read the *Morris* case. It is reported in 30 S. E. R., 850.

The State of Iowa has not authorized city councils to determine when the necessity arises for vaccination of the public generally, or the people of a city, as has the State of Georgia. Nor has it empowered school boards to require the vaccination of the pupils as have Pennsylvania and some other states. The duty of determining what is necessary to be done to preserve, to protect public health, and when it is to be done, has been intrusted by the legislature to the boards of health, State and local. From the necessities of the case, such matters must be left to the local authorities to a large extent. It is competent for the legislature to clothe boards of health or town councils, or whatever agents may be selected, or by what name they may be called, with power to take whatever steps the emergency or conditions demand, to protect the public health. The legislature of this State has given this power to the boards of health, and I am thoroughly convinced that every reasonable order made by the boards of health will be upheld by the courts, even to the extent of requiring all persons not immune, in a community threatened with the dread scourge, to be vaccinated. The reasonableness of any order depends, of course, upon the necessity for it, the proximity of the danger. Many considerations enter into the problem of what is reasonable. Care should, in all cases, be taken not to exceed the bound of reasonableness. But when the necessity arises the matter should be taken hold of kindly, but with a firm hand and in a heroic manner, remembering that *salus populi suprema est lex*.

It was hoped and confidently expected by the State Board that the larger cities of the State, having so much at stake, would promptly and efficiently carry out the beneficent designs of the Board by requiring the vaccination of all school children,

at least, who had not been previously so protected against the disease. Doctor Guilbert, a member of the State Board, and the Health Officer of Dubuque, at once sought to interest his city health department in the matter. After a little fitful discussion of the matter it was dropped so far as any effort on the part of the city authorities was concerned.

Doctor Fred L. Wells, City Physician of Des Moines, brought the matter promptly and urgently before the Board of Health of his city. For a while it seemed as if the city really intended to do its duty. The effort, however, proved an abortion, as will be seen by the following official report of a meeting of the city board board of health, called for the purpose of considering the question to vaccinate or not to vaccinate—to invite this fell disease to a rich harvest, or to adopt judicious methods to prevent its spread, should it appear:

DES MOINES, Iowa, May 24, 1899.

I, E. W. Woodruff, Clerk of the Board of Health of the City of Des Moines, Iowa, do hereby certify that a meeting of said board of health was held in the council room in the city hall of said city on Monday, May 22, 1899, and that the following is a true copy of the proceedings of said board on the day aforesaid, as fully as of record in the office of the City Clerk of the city of Des Moines.

BOARD OF HEALTH.

No. 1,156. By request of City Physician, council met as board of health on adjournment of city council, the Mayor presiding. There were present: Bennett, Johnston, Loveridge, McKay, Patrick, Richter, Work (7).

No. 1,157. A rule entitled "A rule providing for the vaccination of pupils, scholars or students in the schools, colleges, universities and other institutions of learning or instruction in the city of Des Moines," was presented, to which was attached a communication from Assistant City Solicitor Bannister relative to same. There being no motion, same was placed on file.

No. 1,158. On motion of Bennett, council adjourned as board of health.

In witness whereof, I have hereunto set my hand and affixed my official seal this 24th day of May, 1899.

E. W. WOODRUFF,

City Clerk and Clerk of Board of Health.

To Dr. J. F. Kennedy, Secretary State Board of Health, by F. L. Wells, Physician to Board of Health.

Fortunately for the best interests of the State, physically and financially, there were few places but what complied with the order of the State Board to a greater or less extent.

Some of the newspapers of the State that might be in better business tried in every way to thwart the efforts of the Board, and sought to bring disrepute upon the Board and upon any

physicians who should attempt to vaccinate any of their patrons. They attempted to figure out just the exact amount of money that would go into the pockets of the physicians—forgetting the cost of treating and caring for smallpox cases, besides the crippling of business, the heartaches, and the deaths as well.

With these preliminary considerations it is well to proceed to notice the disease as it occurred in the respective counties afflicted by its presence.

APPANOOSE COUNTY.

First report dated January 14, 1899—two cases in Franklin township. Reported by H. E. Wilkinson, Township Clerk, Livingston. Prompt quarantine measures were adopted, the four schools of the township were closed, and vaccination enforced. Result: Disease “did not spread outside of two families, who got it Christmas eve at a Christmas tree at Genoa, just west of us, from a young man named ——, of Genoa, who brought it from Nebraska.”

Results: Two cases—both recovered.

AUDUBON COUNTY.

The first report was January 27th, from the town of Audubon, by the Mayor, W. H. Hanna, Esq. Subject, “a man about 32 years old.” Source thought to be exposure to the disease in the southern part of the State, as he had been on a trip there. Prompt and efficient preventive measures were adopted.

February 18th M. F. Kerwin, clerk of Douglas township, Audubon county, reported one case. He says: “On January 23th I was notified by Mayor Hanna and Dr. Brooks of Audubon, to quarantine every place that Jesse Arney had been staying the previous week, as he was taken down that morning in Audubon with smallpox.” After giving the different points at which Arney had been staying, he says further: “On Saturday evening last Dr. Gleason reported Hugh Murray down with smallpox at the home of his father-in-law, W. K. Jordan—section 5. Said Murray is 28 years old. The only exposure he had was with Jessie Arney ten or fifteen minutes in the cornfield—husking together. The schools were closed and prompt quarantine and other preventive measures were adopted and enforced.”

March 7th Dr. Gleason, above referred to, reported a case in section 5, under his professional care. This was the case above reported by Kerwin.

March 14th Dr. L. Slamberg, of Kimballton, reports as follows: "Maud Wright, 17 years, living with her parents who run a hotel, was taken sick February 27th. I was sent for and found some fever, a cough and headache, no eruption, some flushing of the face, but not more than frequently seen in fevers. March 2d was called again and found an eruption, starting in scalp border, and to me very typical in appearance. I immediately telephoned Dr. Brooks, of Audubon, to come and see the case with me, as the great inconvenience to the hotel people made it desirable that I should not alone decide the diagnosis. Dr. Brooks immediately pronounced the case one of very well marked variola (smallpox), and all precautions were at once taken." A later report from Dr. Slamberg states that recovery took place. There is no information as to the source of contagion. The girl had never been vaccinated.

There being several cases in the neighborhood of Kimballton, Dr. J. A. McKlveen, of Chariton, a member of the State Board of Health, was summoned to visit the locality. He reported to the Secretary under date of April 14th, as follows:

Dr. A. L. Brooks, of Audubon, wired me the evening of the 11th to come at once. Accordingly I left here the same night, arriving at Audubon the next evening. After supper I took a livery team and driver and went out to Kimballton, where I saw Dr. Slamberg, and in company with him we went to see a family by the name of Wright, who were supposed to have smallpox. This was one of the first families in the county to have the disease. The family had been properly quarantined, and the time of quarantine, forty days, had just expired. The doctor told me they had disinfected the day before with formaldehyde gas, bichloride, &c., and the quarantine was released the day before. In this family there was but one case, a girl about 13 years of age; the rest of the family having been vaccinated, did not take it. The history of the case and the pitting of the girl's face gave unmistakable evidence of smallpox. The source of infection in this case could not be traced, but the doctor supposed that she had come in contact with it by meeting with some one passing through the town, at the stores or hotel.

Dr. John Riley, health officer of Exira, reported as follows relative to smallpox at that point:

EXIRA, July 28, 1899.

I was called on February 11, 1899, to see Robert Gransbery, and found he had been having fever, etc., for a day and night. He had staid all night at the Twining House in Audubon, just two weeks previously, and said house was under quarantine for smallpox at the time of my visit. I estab-

lished temporary quarantine of the Gransberys and on the morning of the third day found a few pimples coming upon his forehead and wrists. I then notified the State Board of Health, and instituted vigorous quarantine measures through the local authorities and at once vaccinated the other inmates of the dwelling. These consisted of his mother, a woman of 76, her nurse woman aged 40, with a babe a year old. The hired girl aged 23, and a boy of 15, who was a nephew and acted as chore boy. The boy had been vaccinated previously and his vaccination did not work. None of the others had ever been vaccinated before, and it took well with all. They had no outside nurse, but the hired girl, Miss Ida Foust, took care of the patient until he was able to help himself. On the 15th day she was taken with fever and headache and had to keep her bed two days, when the fever left, and a dozen or so pocks appeared, when she got up and resumed her usual household work. In three days the nurse woman, Mrs. Banning, was taken with headache and fever, and in two days got up and resumed labor, having a few pocks like the other. Two days later the old lady was taken the same way, and in a few days she, too, was well as usual, only having a few marks to show. The boy and the baby remained well. All made uneventful recoveries and were released after eight weeks. Dr. J. M. Emmert, of Atlantic, confirmed the diagnosis.

It will be noted that some of the cases cited by Doctor Riley were varioloid or modified smallpox. As all cases of varioloid are contagious and produced by the same microbes as smallpox they will be regarded as such.

To recapitulate: Audubon, one case, reported by Doctor Slamberg; Exira, four cases reported by Doctor Riley; Douglas township, one case, reported by Doctor Gleason and Kerwin; total cases in Audubon county, six, all recovered.

CEDAR COUNTY.

Mr. S. T. Buell, Mechanicsville, clerk for Pioneer township, under date of April 17th, reported two cases of smallpox in his township. On the 20th he wrote as follows to the Secretary:

Your letter of April 18th, also Board of Health pamphlets and blanks have been received. If you have quarantine notices for use of township clerks I will be glad to have you send me some, not that I expect to have to use many, if any, more in this outbreak of the smallpox, but for use in an emergency.

Dr. N. S. Hubbell, attending physician, reported yesterday a case of variola in the family of Duane Kohl, in Pioneer township; the premises were promptly quarantined. The patient is a son of Mr. D. Kohl—a young man. Dr. H. says it is a very mild case and he believes it will abort.

Of the other two cases in Pioneer township, of which I wrote you in my communication of the 17th, the senior Mr. Butler, Dr. Russell, the attending physician informs me, is pretty sick, but doing well, in his opinion; the case, he says, is confluent. In the case of the younger Mr. Butler, it is varioloid, and very mild at that. He is able to be "around and attend the chores."

As to Mr. Buffington, the undertaker, though not in my jurisdiction, will say he is getting along nicely, so Dr. Russell tells me. His case is varioloid, and he is not much sick.

All persons in the jurisdiction of the local board of Mechanicsville and Pioneer township, as far as known, who attended the funeral of the Zimmerman boy April 3d, were ordered by said board to remain at their places of residence and keep themselves isolated from the public until Monday, April 24th. There is not a case of sickness known of any one of the number as yet.

Under date of April 23d, Mr. Buell reported another case in Pioneer township in the person of Mr. Scott, 20 years of age, making in all four cases in this township—Duane Kohl, the Butler brothers, and Mr. Scott. There was also one case in the town of Mechanicsville, Mr. Buffington, the undertaker who had charge of the funeral of Mr. Zimmerman, of Greenfield township, who died of smallpox, and who was the source of all the cases in Jones and Cedar counties.

Total number of cases in Cedar county, five—four in Pioneer township and one in Mechanicsville, all recovered.

FREMONT COUNTY.

The first notification of smallpox at any point in Iowa was from this county, and dated Hamburg, November 18, 1898. The City Clerk, Mr. J. C. Parkhurst, reported to the Secretary of the State Board of Health as follows: "Our local board of health met November 17th, and one case of smallpox was reported, for which our president (mayor) appointed four police to guard the residence—two by night and two by day. This is the only case reported, and we have it under the strictest quarantine."

On the same date the health officer of Hamburg, W. L. Bogan, M. D., reported to the Secretary as follows:

It is my duty to report a case of smallpox that is now pending in the city of Hamburg, Iowa. About four weeks ago Mrs. T., a lady of fifty years, visited her married daughter in Nebraska City, Neb., who was sick with an eruptive fever, but not well defined; on her return home she fell sick with all of the premonitory symptoms of exanthemata and remained sick for four or five days, when she quit her bed and returned to her domestic duty, without the slightest pimple upon her person. She had been vaccinated when three years old, and at no subsequent period. I was called on the 8th inst., and observed her for three or four days, and there were no pimples of any kind upon her person. On the 15th inst. her single daughter came down with fever pains in head and back, vomiting, and all of the symptoms of an exanthemata, and at 4:30 o'clock P. M. same day she broke out with pimples about the face, neck and arms. The fever fell simultaneously with

the appearance of the eruptions. The eruptions are profuse and the intervening skin oedematus, and fauces sore and painful. The question is, can this case be without doubt contracted from her mother? The local board of health has the case quarantined, and we hope to prevent the spread of the disease. Any information from you will be gladly received and duly appreciated by your humble servant.

November 24th Dr. Bogan reported another case of smallpox in Hamburg in the person of Mr. G. L. ———, a laborer, contracted at Nebraska City.

December 9th Mr. J. A. Armstrong, Mayor of Percival, wrote as follows: "A new disease has broken out in our midst that is causing us lots of alarm, and the doctors do not agree as to its character. Some call it smallpox and some do not. It came from Nebraska City. We took two of our best physicians and went to Nebraska City and examined seventeen of their cases. Our doctors called all of them smallpox, and as we are only about five miles from there we have a great deal of anxiety. Will you please advise me what to do?" .

December 12th Mr. Armstrong reported "one case of smallpox in this vicinity, properly quarantined."

December 18th Dr. Lumm, of Percival, wrote: "We now have two or three cases of smallpox half a mile northeast of town."

December 22d Mr. Parkhurst, the City Clerk of Hamburg, wrote the Secretary:

We have quarantined against Nebraska City, Neb., but we are unable to place a quarantine at the bridge at Nebraska City. We are twelve miles from said bridge, and we are in great danger by people coming here from Nebraska City, and we appeal to you to help us out by placing a guard at the Iowa end of the bridge, as we have no power to place such guard; or for you to act as you think best in this matter. Please attend to this immediately, as every day places us in more danger. Nebraska City has a good many cases of smallpox now, and we have got our cases from people coming from there. Our cases are all well. We don't want any more. No new cases. Please attend to this immediately.

December 23d Dr. Lumm wrote: "We have four cases of variola (smallpox) in the township, or in the family that brought it from Nebraska City. There are no new cases, and I think we have it so quarantined that we can prevent any further spread of it." These are the cases referred to by Mr. Armstrong.

The next day Mr. James A. Armstrong, who is the President of the local board of health, wrote from Percival:

There are no other families here who have the disease. In that family one is recovering and five are down with it. We are very careful in having the place under strict quarantine, and think there is no danger from them. Just north of us a few miles the disease is breaking out—at McPaul—but I suppose those cases have been reported to you. They were exposed by a man coming there directly from Nebraska City. It is out of our township, so we have nothing to do with them. The east end of that bridge is in our township. A great many people are dally passing from Iowa into Nebraska City for the purpose of trading; consequently we are very anxious to have guards stationed there. This would have been done before now if our local board had understood the necessary steps in the proceeding. Our town is not incorporated, so we have no Mayor. We shall be very glad to have you take active measures at once.

December 26th W. E. Robb, of Hamburg, wrote to the Secretary: "We have five cases of smallpox in Washington township, all in one family—M. M. Calkins. They are strictly guarded, day and night."

Mr. Robb is the clerk of the local board.

December 28th Dr. W. L. Bogan, of Hamburg, made the following report of cases under his care:

I herewith submit the whole number of smallpox cases treated by me since November 8, 1898.

Mrs. S. Townsend was vaccinated when a child and is now about 50 years old; made a visit to Nebraska City, Neb., to see her married daughter who was sick of some kind of skin disease, thought to be chicken pox by her physician. Upon her return home she fell sick, in due time, of a fever, backache, headache and vomiting, which lasted for three or four days. There was not a pimple upon her body. In nine days her daughter, Miss Gay Townsend, came down with a fever, headache, backache and sick stomach. In three days she broke out a full crop of eruptions on the face and neck which passed down and covered the whole body with a confluent smallpox, which she caught from her mother. Miss Gay Townsend was 22 years old and had never been vaccinated. About the 28th of November, Miss Bertha Townsend, aged 10 years, vaccinated on the 17th of November, fell sick of the premonitory symptoms and broke out on the 28th day of November, but it appears that the vaccination modified the disease to a great extent, for the case was of the discrete order. Mr. Samuel Townsend, about 55 years old, who had smallpox when a child, came down in due time with what I thought to be nurse pox, was sick a few days and recovered, and assisted in the care of the two daughters until they recovered. Quarantine raised on the 24th day of December, at midnight, and on the 25th, after the house had been thoroughly fumigated with sulphur and the Moffatt formaldehyde generator (A) for six hours, and I had the house shut for twelve hours. Burned all the doubtful goods and replaced them with new articles.

George Greenlee, 35 years old, caught the contagion at Nebraska City, Neb.; had never been vaccinated; fell sick with headache, backache, vomiting and high fever, but did not realize the difficulty, neither did his physi-

cian, but upon the 19th day of November I was called and found a well developed case of confluent smallpox. Henry Greenlee, 17 years old, never was vaccinated; caught the smallpox from his brother George and broke out on the 6th day of December; was more mild than his brother. Mother Greenlee, 63 years old, had been vaccinated when a child; had all the premonitory symptoms for a few days and had a few pimples. John Greenlee, 65 years old was vaccinated when a child; came down with varioloid on the 6th day of December. Quarantine raised on the 29th, after using the formaldehyde as above stated.

Walter Goff, 19 years old; had never been vaccinated; fell sick of a fever, headache, backache and vomiting, and on the 21st day of December he broke out with a well developed case of smallpox and is now convalescent. He caught the disease from the Greenlees.

Baby Greenlee, 1½ years old, broke out with smallpox on the 14th of December; she had never been vaccinated. She is now improving. Mrs. Edd Greenlee, 17 years old, fell sick of all the symptoms of smallpox, and broke out, on the 15th day of December, with confluent smallpox, and is now improving (January 2, 1899). Edd Greenlee, 23 years old, was never vaccinated; broke out with smallpox December 21st, and is now under treatment and quarantine.

These twelve cases have been quarantined, strictly, from the commencement.

At the meeting of the State Board of Health held December 28th, the letters from Mr. Armstrong, of Percival, asking help from the State Board in guarding the bridge from Iowa to Nebraska at Nebraska City, were read by the Secretary, and Dr. McKlveen, of Chariton, a member of the State Board, was requested to visit the locality and render what assistance he could.

January 2, 1899, Dr. McKlveen reported to the Secretary as follows:

Immediately on my return home from Des Moines, I wrote the chairman of the local board at Percival, asking if it would still, in their opinion, be necessary for me to go up to their place, and they replied they thought it would, so I went up, and have just returned from there. I had a meeting this morning with the local board and doctors of the place. They have but five or six cases of smallpox in the town and there are no others in that township. The cases are all confined to one family. Two or three of the cases seem to be, according to the doctor's statements, severe, while the balance are of a mild type. The board seems to be very much worked up over the matter of quarantine against Nebraska City. They told me that smallpox had existed in Nebraska City ever since the first of April, but was kept quiet, fearing that a knowledge of the disease there would damage their business. The cases that have been reported from the different points in Iowa have all originated from Nebraska City. The points infected are Percival, Hamburg, McPaul, Kent, Lacona, and Milo. The board at Percival seems to understand that they have the full power of quarantine, but claim to lack the means for doing it. The railroad and

wagon bridge, about five or six miles below Percival, which connects Nebraska City with Iowa, will have to be quarantined, they claim, as well as the river bank for a number of miles, as the river is frozen over and persons can cross on the ice. The board claimed to be willing to look after the quarantine, but thought inasmuch as it was an interstate quarantine, the State should pay the expense. This I had no authority to grant, and do not know that the State has any funds for such purposes, but promised I would write the Governor in regard to the matter, which I have done. They thought they would be able to quarantine at an expense of about \$8 per day. The report is that the disease is becoming more severe with the cold weather.

January 29, 1899, Dr. M. L. Thomas, of Percival, wrote the Secretary:

I report the following new cases of smallpox near Percival: Six miles southeast, eight cases contracted at Nebraska City during the so-called quarantine of the disease in that place. Eight miles southeast, one case—a family of eight exposed—contracted from the same source. These cases are all under rigid quarantine. The local authorities here are doing all in their power to stamp out this disease, but they are becoming discouraged in their work. Nebraska City has raised her quarantine and left us without any protection. I fear if the State does not help in this matter this part of Iowa and other parts of the State will have the greatest epidemic of smallpox it has ever had, and will cost the State and counties a great amount of money.

The next report from this county was from the health officer of Hamburg, Dr. W. L. Bogan, and was dated May 6th. He said:

I have the pleasure of reporting the several cases of smallpox in the family of Samuel Smith. They were stricken in March, from the 1st to the 20th, as follows: Alva Smith, Clemmie Smith, William Smith (uncle), Myrtle Smith, Samantha Smith (mother), Hettie Smith, Pearlle Smith, Jessie Smith, Samuel Smith (father). Quarantined March 10th. Raised May 5th. Hettie Smith and ——— Smith were vaccinated at the appearance of the disease in the family. The first had the varioloid, the latter an immune. All seemed to be of the discrete character, except the father and mother. These two had the virulent form and are badly marked. The disease left no sequel of a bad nature. Before raising the quarantine all doubtful clothing, bedding and draperies were burned. The parties, during their illness, took care of a team of horses, consequently I had the stable and the horses disinfected, also the privy vault, by using a solution of sulphate of iron and carbolic acid. I had the yard raked and rubbish burned, then had the yard and walks sprayed with solution of sulphate of iron. Had the parties all bathed, then washed in a solution of carbolic acid and dressed in clean clothing. I had each room fumigated with sulphur, cooled them off, and then used formaldehyde for six hours, opened the apartments and thoroughly ventilated them, and moved the family in; considering there was no more danger.

Total number of cases reported from Fremont county: Hamburg, 27, Percival, 15; Benton township, 4; Washington township, 5; total 51. No deaths; very few families infected.

HENRY COUNTY.

The only cases in this county were reported by Dr. J. A. McKlveen as follows, under date of May 17th:

Night before last, about 9 o'clock, I received a telegram as follows: "Come Rome immediately; investigate smallpox, by request of Secretary Kennedy." Signed, Frank Garvin.

The next morning I telegraphed him when I would be there. I accordingly took the train and arrived there at 1:43 P. M. He met me at the depot, and after talking the matter over we went out $1\frac{1}{2}$ miles into the timber, where he had them quarantined in a canvas tent, a quarter of a mile from the public highway and a half mile or more from any house. The history of the matter is about as follows:

The Chicago, Burlington & Quincy Railroad company is building a track from Fairfield to Mt. Pleasant and are working a large number of men along the line. The men are camping in tents or squads all along the line. It appears that a couple of colored men from Tennessee recently went to work at one of the camps on Skunk river and shortly after were taken sick. It was, after a few days, diagnosed as smallpox. The men were moved out of the camp to their present place of quarantine on last Saturday night. They were broken out with the eruption at the time of moving and the camp where they were quartered have been exposed to the disease. I examined the cases and pronounced them typical. They may be called the discrete variety, though the pustules are very closely set and may run together or coalesce so as to form the semi-confluent. I think the cases who already have the disease are properly quarantined and will be kept so, but there is great danger from those parties who were exposed in camp before the removal of the sick. I ordered a thorough and close quarantine of the persons in the camp from which the patients were taken, and I have no doubt it will be done, for the people in the neighborhood, in Rome and Mt. Pleasant, are thoroughly aroused. They have a couple of colored men, who have had the disease, taking care of the sick. The circumstances are very unfavorable on account of the new track of road that is being built, and the liability of the men to come in contact. The type of the disease is much more pronounced and severe than anything I have seen during my investigations so far. Mr. Frank Garvin is chairman of the local board of health at Rome.

Dr. Fisher was sent out from Chicago by the Chicago, Burlington & Quincy railroad to assist the local authorities in preventing its spread. He visited the Secretary of the State Board and together a plan of preventive measures was agreed upon. Dr. Gray, of Mt. Pleasant, had charge of the cases. There has been no report from him.

Cases in Henry county, two; no deaths.

HOWARD COUNTY.

May 21st, Dr. J. C. Shrader, Iowa City, member of the State Board of Health, sent to the Secretary of the State Board the following report:

On the 19th of May I was called by the health officer of Cresco, Howard county, to come at once to investigate some cases of a suspicious character, and assist in making a diagnosis and, if found to be infectious, to assist in controlling the same.

I started via Cedar Rapids on the first train and arrived there on the 20th, accompanied by Dr. Nicol, of Mason City, whom I met on the train and invited to accompany me. On our arrival we were met by Dr. C. D. Roome, mayor of the town, and Dr. William Connolly, the health officer. We immediately repaired to a hotel where I obtained the following history;

On or about March 20th a young man came here from Montana, who was broken out with an eruption when he arrived. In a reasonable time, some three or four members of the family where he was stopping became affected with the same form of trouble, not very serious in character, and requiring but little treatment; in fact, could not learn that they were visited by a physician at all. No deaths. Symptoms, as near as could be learned, headache, backache, high fever, lasting but two or three days; an eruption soon made its appearance, papular, vesicular and some of them pustular; some were umbilicated, but not many. As near as I could learn the family had been protected by vaccination, evidently, to my mind, rather mild cases of varioloid. If any name was given to the disease at all it was called chicken pox. No precautions were taken to prevent its spread. The disease becoming more prevalent was called chicken pox. The disease was of a mild type, many persons not calling on a physician. The eruption which appeared varied somewhat in character, but much more in quantity. Where a good description could be had it went through the three stages of being papular, vesicular and pustular. Some of the eruptions, in the milder cases especially, were aborted and did not fill well with pus. Many were well filled with pus and were umbilicated.

After getting this history from the mayor and health officer, we started about the town to see some of the cases, accompanied by Dr. Nicol. We found the disease existing in all ages, but mostly in adults, and in nearly all degrees of severity, from the mildest form of varioloid to that of quite a severe type of genuine smallpox. I will give you the history of one case out of four in one house.

Miss M., about 35 years of age, was taken sick nine days previous with a pain in head, back, limbs, severe, some chilly sensations followed by fever; temperature on second day 104 degrees; pulse 110 to higher (could not learn). In some three days from the initial symptoms an eruption made its appearance, papular then vesicular, and now mostly pustular. Face very much swollen and bloated, almost disfiguring the countenance, on the face confluent, but in the hair, on limbs, and on body, discrete, but very thickly distributed. She is quite seriously sick. In fact, the disease is becoming very severe in character.

There have have been no precautions taken during the two months of its existence. It is difficult to estimate the number of cases that have been there and still existing. Probably fifty cases at the present time would be a very moderate estimate, and I was informed that it has spread into the surrounding country. I could not learn its extent. I said: "Your town and surrounding country is already infected with smallpox, and while it has been of a mild type, it is becoming more virulent, and it becomes your duty as health officers to do all in your power to stop its spread. Say to your ministers to stop holding public meetings, close your schools, establish and maintain a strict quarantine. You have a town of nearly 3,500 inhabitants, nearly all of whom have been exposed to the contagion. Assist the people in the country to get rid of the pestilence. You are liable to have many deaths before you can get it fully under control. Write to the health office at Des Moines often and the Board will do all in its power to assist you."

May 24th Dr. William Connolly, health officer of Cresco, wrote to the Secretary:

As you probably have Dr. Shrader's report before this, and are aware that we have smallpox here, I will state that up to this date we have quarantined six houses for same. In two of these the cases have developed since last Saturday, the 28th inst., the date of Dr. Shrader's visit. These last two are cases of varioloid, one an adult, the other a child.

In none has it assumed a severe form, in fact but one being sick enough to be abed, and no fatalities.

We are investigating every case and using the strictest precaution to prevent spreading.

There are four or five families quarantined outside of the town in the township, but at last report were all doing well.

Will keep you posted as we proceed, and will appreciate any suggestions you have to offer.

Dr. J. F. Torpey, of Elma, under date of June 19th, wrote:

Was called on the 17th and 18th inst. by health board of Paris township, Howard county, to investigate the family of Will Smith, Jr. and Meyer O. Lyden, and found at Mr. Smith's what I considered to be smallpox, although in a very mild form, and at Lyden's one of the boys did not see Meyer's boy, but understood from Doctor Dittmer he had a fever of 105 before the eruptions came out.

Those cases can be traced to Cresco, as Mrs. Meyers was there nursing her daughter for one week, and one week from the day she came home she was sick; that made it about fourteen days from the time of exposure until symptoms developed. Gave orders for strict quarantine and would be glad to hear from you if you have any suggestions to make on the matter.

The New Hampton Gazette said the following, relative to an outbreak of smallpox at another point in Howard county. The Secretary was not able to get any confirmation or denial:

The little town of Lourdes, lying north of here, is under a strict quarantine because of three genuine cases of smallpox near there. As a result no services were held in the church there Sunday. It is said that all of the cases are traced directly to Cresco, where the victims were exposed to nothing more than W. R. Mead's "chicken pox" and "Dutch measles." Queer, isn't it?

Doctor Connolly, of Cresco, filed the following final report as to smallpox in his city, he being the health officer:

In compliance with your request for a report on the epidemic of smallpox, I herewith submit the following:

Early in March a young man, returning from Spokane, Wash., arrived here broken out with a rash that he claimed was contracted while enroute home. He consulted a physician, but having no constitutional disturbance and the history not being clear, he was cautioned to go home and be cautious and send word in a day or so. Nothing more was heard of the case until another member of the family came down, shortly after, when the same physician was summoned, but finding no eruption, withheld any opinion until further developments, but next day they sent word to the physician that she was all well. So here, too, no diagnosis was made. In the meantime the young man was going about, and also his sister, with the eruption, but it was spoken of as chicken pox.

The next cases were some of the relatives of this family, but as they were not sick enough to send for a physician no diagnosis of smallpox was made in their case, it being generally reported among the neighbors that they had chicken pox.

The next victims were the family of Albert Struson, near neighbors, of whom the father and two or three of the children had an eruption, one of the children, an infant, dying, as was supposed, from the effects of whooping cough which it had at the time and so certified to by the physician called in to see it just previous to death.

This occurred early in April and up to this time none of the physicians had had a chance to make a diagnosis, since if they were called at all it would be once and before eruption had appeared and perhaps never to see the case again.

In the meantime a sister of the wife of the last named party contracted it, and though no precautions were taken, her husband and young child did not have it. Can not say as to vaccination in any of these cases. They were suspicious by this time, and at a meeting of the Howard County Medical Society on the 10th of April, I brought the subject up for discussion as to the nature of the disease and the best means of suppressing it. Considerable discussion took place, with a division of opinion as to what it was, but awakening us all to the fact that a disease spreading as it was, demanded the most thorough care and investigation of every case, and it was but a few days when one of the physicians, a member of the society, was called to attend a patient and at once made a report to the local board, as a case of smallpox. This naturally alarmed the community, and as there was a difference of opinion among the physicians, the local board deemed it advisable to send to the State Board for a man in whom they had confidence, to decide. It was some days before anyone could come, and in the meantime we had

quarantined three families. This was the state of things when Dr. Shrader, whom the State Board selected, arrived here, and after a thorough investigation and examination of the cases, he pronounced the disease smallpox.

From this we began to follow up every report, with the result that we quarantined in all twelve families in the city and the east end of Howard county. There were also four or five cases in the southwest part of the county, but these were directly traceable to exposure to cases here.

Now, as to the cases here. One of the first that was quarantined was the family of Fred Schotte, consisting of himself, wife and two children, and a brother of Mrs. Schotte. Mrs. Schotte was the first to have it, unvaccinated, and a very mild case. Next her brother, aged 25 to 28; also unvaccinated; also mild. Then her child, aged 15, successfully vaccinated—considerably milder than the others. The father, and son aged 14, both of whom had been successfully vaccinated some years ago, did not take the disease, although no special precaution could be taken to isolate the rest of the family.

During the quarantine of the members of this family a sister of the mother also contracted the disease, and was removed to the premises. She had never been vaccinated and had it quite severely, being the only case approaching a confluent form that we had. These cases all made a good recovery.

Another case quarantined was the family of C. Garlic, whose wife had it quite severely. The husband did not have it, although he never had been vaccinated. A stepdaughter in the family who was vaccinated previously did not have it, and Mrs. Garlic made a good recovery, although some marked.

Besides these the following cases came under our notice and were quarantined:

Mrs. John McNamara; mild, unvaccinated. Father and child, although not vaccinated, did not have it.

Minnie Porter, aged 35; vaccinated, mild.

Mrs. Joseph Reed; unvaccinated, abortive attack.

Mrs. Joseph Reed's child, aged 14; unsuccessful vaccination, mild. Another child, vaccinated, did not take it.

Family of Mrs. Harris, consisting of brother-in-law and four children. Mother and three children had it. Not any of these were ever vaccinated. The brother-in-law and oldest child, who gave history of previous vaccination, escaped. These cases were all mild, and recovered without any pitting.

Two children in family of William Lathrop; mother escaped unvaccinated. Father not exposed. The two children gave evidence of previous vaccination and both had it very mild.

Nelson Porter; previous vaccination twenty years ago, severe.

Mrs. Porter, wife of above; vaccinated, mild.

Child, aged 7; unsuccessful vaccination, mild.

Child, aged 4; unvaccinated, severe.

Infant, aged 18 months; unvaccinated, mild.

Stephen Porter, brother of Nelson, in same family; history of vaccination twenty years ago, severe and very sick. Three in this family are quite badly "pitted," viz.: father, brother and child, aged 4 years.

Carrie Hill, servant, was taken sick at Ridgeway, Iowa, and came to stay with her sister who resides here, and the entire family were quarantined.

Two children in this family, who were vaccinated previously, had a very mild attack and the mother and baby, although unvaccinated, escaped.

Miss Hill; not vaccinated, mild.

William Seeley and wife; unvaccinated, both cases mild.

William Millington; unvaccinated, severe. Wife and child vaccinated after exposure; escaped.

Two in family of T. R. Seeley, in Winneshiek county, two miles from corporation of Cresco. Understand they had it severe. Am not able to give history of vaccination.

Miss Brunner, in Albion township, who gave a history of exposure in Cresco, and a sister of Mrs. John McNamara, one of the cases above; unvaccinated and had it mild. Although there were several members of this family, none of the others contracted it.

This covers all the cases that come within our knowledge, and we are fortunate in that there were no fatal cases. The child died from the result of whooping cough.

The last quarantine was raised about the 4th inst. and we are now without a single case that we know of in the entire city or county.

The history of exposure shows every case except that of Miss Hill (where source of exposure is unknown) to be due to intimate relations with some one who were supposed to have it, or the so-called chicken pox, early in March. We feel like congratulating ourselves that we have been able to eradicate it so thoroughly, without the loss of many precious lives of the community, which was undoubtedly due to the thorough and prompt action of the local board in enforcing quarantine regulations, being ably assisted by the co-operation of the majority of our citizens.

Total number of cases reported, 46. Cresco, 40; Paris township, 3; Lourdes (?), 3. There were no deaths.

JOHNSON COUNTY.

About the middle of June, Dr. J. C. Shrader, Iowa City, reported a case of smallpox in Iowa City, in the person of Lincoln Pope, who had been exposed to the disease at or near Le Claire, Scott county. Prompt measures were at once instituted looking to the prevention of its spread—quarantine, isolation, vaccination and disinfection.

June 25th he made the following additional report:

We have another case of varioloid in Iowa City. The father of young Pope, who came here some two weeks ago on a night train on the Chicago, Rock Island & Pacific railway, has contracted the disease, but owing to the fact that he was protected by vaccination, is having varioloid. This man slept with his son one night before the case was diagnosed. Some others have been having the premonitory symptoms, but up to last evening no other cases were reported. The first case is doing well.

On the same date he reported further:

There was an attempt made, or about to be made, to remove these small-pox cases to a hospital owned by the city, "made and provided in such cases," when the township trustees of the township where this hospital is located, although owned by the city and isolated from the highway and any dwellings, sued out a writ of injunction against the city, restricting them from removing the infected patients. The case came up for a hearing (here), before Judge Scott of Brooklyn. He sustained the injunction and thus prohibited the health officer from removing the patients. What shape this will leave matters in, or what course the city will now pursue, I do not know, as the case was not decided until Saturday evening.

As this is a very interesting case I will keep you advised in the premises.

Still another case was reported by Dr. Shrader on the 30th of June as follows:

I sent you a telegram this morning informing you of another case of varioloid in Iowa City. A young man some twenty years old, Frank Teeter, who met Lincoln Pope at the depot when he came here from Davenport. He stayed with him for an hour. He has been running about until yesterday evening when he went to his boarding house and got his supper, and was at that time broken out to a small degree; was seen soon after by the health officer, Dr. Miller, and placed under strict quarantine. He is not very sick. The health officer says that he has about a dozen papules on his face, and some coming on other parts of his body. We will keep close guard on him so as to prevent the spread of the disease if possible. There is nothing further in the pest house case since Judge Scott's decision, this being prepared to take before the superior court for decision. There is being a temporary hospital got in readiness that will be ready for occupancy by to-morrow evening. I have just learned that they have an outbreak in Davenport.

In regard to our smallpox cases: The city has procured some other ground and has erected a temporary hospital there, and has removed all of the cases (three in all) to these new quarters, outside the city, and still near enough for convenience. All are doing well.

The case decided against the city by Judge Scott will be appealed to the supreme court, so that hereafter we may know just what rights municipalities have in such cases.

Total number of cases, three. All recovered, as shown by later reports.

JONES COUNTY.

One of the most alarming outbreaks in the State occurred the latter part of March in Greenfield township, Jones county, in the family of Mr. Henry Zimmerman.

Dr. N. S. Hubbell, of Mechanicsville, had charge of these cases. April 14th he wrote the Secretary of the State Board of Health as follows:

In answer to yours of April 13th, would say that there are, so far as has come to my knowledge, in Greenfield township, Jones county, Iowa, seven cases of smallpox and one of varioloid, five of which are under my immediate care.

They are typical cases, progressing in the usual manner and all promising to make good recovery.

The infection came through a son of Mr. Zimmerman, who presumably had contracted the disease in Davenport, this State.

Was taken sick on the 22d of March with what proved finally to be the hæmorrhagic variety of smallpox, characterized by an erysipelatous inflammation of the skin, more marked upon the face and hands, with a slight blush extending over the whole surface. No vesiculation of the face nor hands. Rapid swelling on the second day and on the third day covered with large blisters the size of a half dollar.

Eruption on chest simulating zona. Eruption on back, arms and limbs, resembling urticaria. Temperature 105, with great delirium.

Tongue at first coated with a heavy white coating, rapidly turning brown, and enormously swollen on third day.

On the eighth day called Dr. Cogswell, of Cedar Rapids, in consultation, at which time patient seemed to be slightly better.

The whole of these symptoms, as so far detailed, seemingly pointed to rhus poisoning, to which he had been exposed.

From this time on he grew rapidly worse and died on the thirteenth day, the last three days of which were characterized by a sickening odor, but not exactly like the smallpox odor, with which I am and have been familiar for thirty years, as I have passed through two or three epidemics of the same.

There never at any time was any pustulation, the whole of the poison seeming to be eliminated through the blisters and thrown off at the lungs.

There are at my house three ladies, one of which is a professional nurse. Themselves and all of their clothing have been thoroughly disinfected by the use of bichloride baths and are now quarantined.

On the same date Dr. Shrader wrote thus from Iowa City:

I have just returned from Lisbon, Mechanicsville, etc., investigating the outbreak of smallpox in that vicinity and in the southern part of Jones county.

On Sunday, April 2d, a young man by the name of Zimmerman was buried, his death being occasioned by some obscure form of disease that Dr. Hubbell, of Mechanicsville, the attending physician, called blood poisoning; said it looked like it and had been caused by rhus. Dr. Cogswell, of Cedar Rapids, was called in consultation, and said it was caused by rhus; that he had had two cases of the same kind recently in his own practice. The young man had been gone from his home for about a month, and was taken sick soon after his return. There have been not less than 250 exposures; besides, the two sisters of the young man, who had been attending school at Mt. Vernon college, went home to care for the brother who died; then they returned to school. They were taken sick there, one while attending her recitations. They, with three other members of the family, are now very sick with smallpox, but only after the worst exposure ever

occurring in this State, as far as I can learn. I have ordered strict quarantine at Mt. Vernon, Lisbon and Mechanicsville, and have sent word to the health officers in the two townships in Jones county, all of whom are directed to correspond with you frequently. This matter will require close and careful attention. I told them to report to me often, also, and if necessary I will visit the field again. I think the people are now fully awake to the gravity of the situation.

A great deal of bitter and unjust criticism of Dr. Shrader was indulged in because of the above declaration that "there has been not less than 250 exposures." It was declared that he made this statement as to the number of exposures in Mt. Vernon, when he said no such thing. The statement that one was taken sick while attending her recitations was a great deal nearer the truth than his traducers were willing to admit.

Miss Estella Zimmerman was kind enough to furnish the following statement as to her own sickness and that of her sister:

Yours of the 7th just received.

Sister Dora and I entered school at Mt. Vernon, Wednesday April 5. Dora was taken sick in the night, the first night we were there, consequently did not attend one of her recitations. I attended my recitations that forenoon and when I returned to my room found her no better, so I hired a livery and brought her home that afternoon with the expectation of my returning, but when I reached home I found my mother and younger brother sick, so I did not go back. I was taken sick that night. I had no symptoms while at recitations more than a tired feeling which I had all the while my brother was sick. My brother had never been vaccinated, neither had any of the rest of us children.

Mother and father had been vaccinated while they were children.

My mother had the smallpox quite light, but father did not contract the disease. Brother Howard and our hired man did not contract the disease and were not vaccinated until it was pronounced we had the smallpox.

My father and brother make the two members of our family who were exposed to the disease and did not contract it.

The following reports from the physicians in attendance upon these cases are not only interesting but valuable. The reports of Doctors Kepler, Russell and Hubbell were made to Doctor Burd, of Lisbon, who very kindly put them into my hands.

Dr. D. E. Williams, residing in Martelle, is the health officer for Greenfield township, who, after several communications respecting the outbreak progress of the disease, and measures taken for prevention, briefly summed up the cases as follows:

On the evening of April 12, 1889, the board of health of Greenfield township of Jones county, Iowa, met in my office. Mr. Burroughs (member of board), reported five cases of smallpox in the family of Henry Zimmerman. Diagnosis made by Dr. Hubbel of Mechanicsville, Iowa. On inquiry as to the probable source of contagion, I learned that a son of Mr. Zimmerman came home sick about March 25, 1899, after having visited in Davenport, Clinton and other large towns. Dr. Hubbel was summoned, and not feeling satisfied as to the nature of the disease, called counsel from Cedar Rapids. At that time the doctors called the disease blood poison. The young man rapidly grew worse and died April 21. A public funeral was held at the residence, which was largely attended. People from Mt. Vernon, Lisbon, and other places being present. Mr. Zimmerman has two daughters (Stella and Dora, whose present address is Mechanicsville, Iowa), who were attending college at Mt. Vernon, at the time of the young man's sickness. A few days prior to his death they came home and remained until after the funeral, then returned to Mt. Vernon. About April 10th they were taken sick, though whether in the recitation room or not I do not know, and came home. April 12th Dr. Hubbel notified a member of the board of health that there were five cases of smallpox in this family, two of them being the young ladies mentioned above. As soon as I was apprised of the fact I wired you asking for a member of the State Board of Health to investigate. You are familiar with results of investigation made by Dr. Shader.

There were ten families infected—twenty-four persons, with only one death.

I believe the disease was kept in check by the efficient work of the attending physicians, who were always ready to assist the Board of Health in any way possible.

The physicians who attended were Drs. Hubbel and Russell of Mechanicsville, Dr. Kepler of Mt. Vernon and Dr. Burd of Lisbon.

Dr. Edwin Burd of Lisbon reported:

I have to say that as far as I know there were no cases in Linn county, except the two Zimmerman girls, who were taken sick at Mt. Vernon, and were at once taken to their home in Jones county, and were under the care of Dr. Hubbel.

Following is list of my cases:

Ben Hempy, Greenfield township, married; varioloid; visited him April 17th; very mild; fumigated them May 17th with formaldehyde gas. No further cases in this home, as he was promptly and thoroughly isolated from his family and others.

Chas. Long, Greenfield township. This case is given in Dr. Kepler's report as a case of varioloid, but as we differ decidedly in diagnosis, I give my version. April 14th I vaccinated him; April 25th he sent for me, fearing he was taking smallpox. He had visited O. B. Kohl's April 6th, and O. B.'s son James was taken sick with smallpox April 7th. I diagnosed the case as vaccinia, as the vaccination was working finely. On the 26th Dr. Kepler saw him and diagnosed the case as smallpox, and he so reported it. He was accordingly quarantined. There are no marks nor stains of any kind left on his body or face such as are still to be found on all the others, thus proving my diagnosis to be correct.

Wilbur Miller, Greenfield township; age about 20; vaccinated him April 14, 1899. He came to town, April 22d, in the vesicular stage of mild variola. I sent him home at once; visited him next day; said he was taken April 15th; resumed work April 19th; was quarantined April 23d; clothing, etc., burned and house fumigated May 11th; no further spread in this home, nor in town.

I had one severe case of what Gould in his excellent dictionary describes as vaccine lichen, which puzzled me for twenty-four hours. It was much severer than any case of smallpox seen by me (I only saw five cases, two of my own and three of Doctor Kepler's).

In vaccinating I used the virus put up in tubes, altogether. I vaccinated 344 persons and, so far as I could ascertain, not more than 60 per cent were successful. Saw three or four bad arms with necrosis of tissue; no serious results.

Dr. T. S. Kepler, Mt. Vernon, reported to Doctor Burd as follows, it being a copy of a report made to the Mt. Vernon board of health.

Your health officer requested me to give a report of cases of smallpox under my care.

1. The case of James Kohl, aged 20 years, single, was ushered in April 7, 1899, and proved to be a severe one in confluent form.

2. Myrtle Kohl, aged 8 years, was taken sick about April 20th, and was a well developed case in concrete form of the disease, going through the several stages, papular, vesicular and pustular.

3. Birdie Kohl, aged 12 years, had similar symptoms as No. 2, yet very much milder, which cannot be accounted for unless modified by a severe spell of diphtheria in early life.

4. O. B. Kohl, aged 42, had well developed symptoms of disease with initial eruption after the stage of invasion. I might say that Mr. Kohl, as well as Mrs. Kohl and myself, made use of spirits of turpentine, externally, it being a reputed remedy, in the South, to prevent the disease.

5. George Hempy, aged 35, single, became ill about April 11th, and was seen for the first time April 13th. At this time the initial rash was out over back and hypogastrium and thighs. In a few days the general rash came out and with it the decline of fever. As the vesicular and pustular stages progressed the fever came up again. His was not a severe case, only in the stage of invasion. He had no protection by vaccination.

Charles Long, aged 26 (single): I did not see him during the time of invasion, which began, perhaps, near the 22d of April. On the 25th the eruption was out quite thick over back and thighs. At this stage the disease seemed to be arrested by a successful vaccination which had been made during the incubation stage of smallpox. When the vaccination had reached the stage of areola, or about ten or eleven days, the smallpox ran its usual course, somewhat modified, we thought, by the vaccination, but it made diagnosis obscure for a time. All the above cases did well and quarantine was removed on the 24th or 25th of May. James and Myrtle Kohl are under moral restraint for another week.

Dr. N. S. Hubbell, Mechanicsville, who had charge of the Zimmerman family, reported to Dr. Burd:

In answer to your request of the 18th, say:

Case 1. Irvin Zimmerman; date of invasion, March 23, 1899.

Case 2. Estella Zimmerman; date of invasion, April 5, 1899.

Case 3. Elva Zimmerman; date of invasion, April 5, 1899.

Case 4. Dora Zimmerman; date of invasion, April 5, 1899.

Case 5. Harlan Zimmerman; date of invasion, April 5, 1899.

These were variola, all very light cases, and ran a very mild course and were discharged on the 21st of April, as the cases then were nearly clear of the scabs.

Case 6. Mrs. Zimmerman; date of invasion, April 6, 1899.

This was a case of varioloid, and extremely mild and was discharged on the tenth day.

Case 7. William Robinson, Jr.; date of invasion, April 13, 1899.

Mild and discharged April 30th.

All these were typical and of the discrete form with the exception of the first, which was complicated with an intense erysipelatous inflammation, developing on the third day blisters as large as a half dollar on arms, hands and feet, with great swelling and oedema of the parts. In this case there were no matured pustules, the specific virus being concentrated in the serum of the blisters.

Of primary vaccinations all were successful so far as reported. I used both points and tubes from Parke Davis & Co. Observed no material difference in the efficiency of either. There were a few re-vaccinations in probably full one-third of all cases. There were no cases of undue inflammation following any of these, although I saw some very bad arms in others, but cannot say that it was due either to the virus or uncleanness.

Dr. Scott Russell, Mechanicsville, reported to Dr. Burd, as follows:

Your communication of June 15th was duly received and it was not convenient to reply earlier. In regard to the smallpox cases, will be pleased to give you a short sketch of the thirteen cases coming under my care, and you can sift out what will be of use to you and discard the rest. Some of them were serious, others quite light. Some it appeared difficult to define the shades of difference between mild cases of variola and severe cases of varioloid.

Otho Brokaw, aged about 28 years. Was assisting to care for Zimmerman before his death, which occurred April 2d, and one of the pallbearers at the funeral April 31. Had been seen a few times by Doctor White, when the case came into my hands, April 13th. The papular stage was fairly well established. From the history there had been high fever, rapid pulse, headache, pain in the back, irritable stomach. This was a case of unmodified smallpox, confluent on the face, semi-confluent on the body and extremities. The nervous system was greatly affected, almost delirium, with considerable insomnia. There was considerable inflammation of the mucous surface (nose and throat), and through the pustular stage thoroughly studded with pustules, causing difficult deglutition. The pustules

had a macerated appearance. The conjunctiva was slightly affected; the heart weak. When the vesicles were at their full stage they stood out like grapes. The face was greatly distorted in the pustular stage, the eyes nearly closed in, and the nose looked like a chunk of putridity, a *most horrid sight*.

Leslie Miller, aged about 26 years. Saw this case first April 13th. This patient had been exposed in the same manner as the first case. Appeared to be a few days further advanced than case No. 1. The history of initial stage was similar to the first case. This was the discrete type, passing through the different stages in their full development. The mucous surfaces were only slightly affected, the nervous system considerably affected. No complications.

E. V. Miller, aged about 28 years. Saw this case April 13th. Was exposed in the same way as the other two cases. Was just in the initial stage—headache, pains in the back, irritable stomach, temperature 104, pulse 130, great restlessness, insomnia, and weak heart. Passed through the three stages in a fully developed form, of the discrete variety. Inflammation of the mucous surface caused great suffering, deglutition being quite difficult and the eruptions well marked. The conjunctiva was seriously affected. No other complications.

James D. Butler, aged about 46 years. Assisted in caring for Zimmerman previous to death, and was present at funeral. Saw this case April 16th. The papular stage had just commenced, the history of invasion being similar to above cases only more intensified, passed through the different stages in a fully developed form, and was of the discrete variety (a very severe case). Inflammation of the mucous surface very extensive, deglutition almost impossible for two or three days, eruption well marked on mouth and throat, heart extremely weak, conjunctiva slightly affected, diarrhoea severe, insomnia severe.

James Butler, Jr., aged about 21 years. History of exposure same as case 4. Saw this case April 16th. The initial stage was just commencing. The same general symptoms as other cases, in much modified form. Temperature 102, pulse 110, continued about three days, when papules made their appearance—in all about twenty, scattered over face, body and extremities, passing into the vesicular stage and disappearing. There was considerable nervous disturbance. Although this appeared a light case, the patient had an extremely emaciated appearance, for so short a time.

Mr. Buffington, aged about 36 years. Conducted the funeral. Saw the case April 16th. Had vaccinated him two days before. Had not felt well for several days, and complained of feeling cold one day, but had no distinct chill. Found papules scattered over head, face, body and extremities—about twenty or thirty in all. Passed through the different stages in a fully developed form. Slight inflammation of the mucous surfaces, nervous system slightly affected, insomnia considerable. No other complications.

Notley Scott, aged 20 years. No further history of exposure than that he had been around Zimmerman could be obtained (and that evaded as much as possible.) Saw this case April 19th; headache, pain in the back, irritable stomach, temperature 103, pulse 120. Saw the case next day; about twenty papules, scattered over face and body; the other symptoms disappeared. April 21st papules still present. After this the case passed out of my hands and was discredited.

Mrs. Brokaw, mother of case No. 1, aged about 55 years. Saw this case April 27th; was constant attendant upon her son. Initial symptoms slight; bad feeling for three or four days with rise of temperature about 2 per cent. April 30th papules appeared on head, face, body and extremities, about twenty or thirty in all, passing through the different stages; weak heart; no other complications; did not have to keep her bed.

Miss Brokaw, aged about 23 years, daughter of case No. 8. Had done the house work during her brother's sickness. May 1st appeared slightly indisposed but was able to do house work. May 3d papules appeared on face, subsequently on body and extremities, about fifteen or twenty in all, passing through the different stages (one notably on the extreme point of nose, when fully developed in vesicular stage was as large as a small cherry); no complications.

Owen Brokaw, brother of case No. 1; same history of exposure as case No. 1. May 5th had chill, headache, pain in the back, irritable stomach, temperature 104, pulse 130. May 8th papular eruptions appeared on head, face, neck, body and extremities, and in due time passing through the other stages in an unmodified form of the discrete variety. The mucous surfaces slightly affected; the nervous system considerably affected; heart weak; considerable insomnia; no other complications.

Mr. Brokaw, father of cases Nos. 1, 9 and 10, aged about 55 years, was not exposed outside of his own family. May 8th was feeling wearied, slight headache, pain in back and limbs, irritation of stomach, slight rise in temperature. May 11th papules appeared on head, face and body—about twenty in all. Feebly passing through the different stages. No complications.

Frank Hempy, aged 21 years. Fanny Hempy, aged 18 years. History of exposure, attended the funeral of Zimmerman. Saw these cases May 3d, with the following history: April 30th, headache, pain in the back, irritable stomach, continued until May 3d, and found temperature 104, pulse 110, face looked like scarlet fever, papules appeared the following day on head, face, neck, body, and extremities, in both cases. May 7th, Frank Hempy very weak, pulse 48, and continued so through the different stages. No complications. This was the discrete variety, in mild form, although the prostration was unusually great. Vaccination, used Parke Davis & Co.'s glass tube; did not have any cases of erysipelas. The percentage of successful vaccinations was low.

The following is an account of the families vaccinated, who had the smallpox. The Brokaws were vaccinated April 13th. Subsequently, Mrs. Brokaw twice, Miss Brokaw twice, Owen Brokaw once, Mr. Brokaw once. On Mrs. Brokaw the areolæ was one inch in diameter. On Miss Brokaw the areola was one and one-half inches in diameter, with considerable constitutional disturbance in both cases. Owen Brokaw made feeble showing; Mr. Brokaw, none to speak of.

Mr. James D. Butler's family were vaccinated April 16th. Two in the family showed good areole, two none. The isolation was a poorly-fitting door, with sheet curtain, disinfected. None had the disease only as described.

Mr. Buffington's family were vaccinated two days before he was taken sick. Mrs. Buffington attended him and slept in the same room, but did not take the disease.

Frank Hempy and Fanny Hempy were vaccinated April 16th. The vaccination did not take on either case, but may have caused the subsequent sickness.

Would say in case No. 1, opened a great number of pustules on the face, but it is impossible to see any benefit.

If I should have any more cases, feel convinced that the proper time to open the pox is in the mature vesicular stage.

Total: Ten families afflicted; twenty four cases; one death.

LEE COUNTY.

The only case occurring in this county was in West Point, Pleasant Ridge township. The case was thus reported by Dr. John G. Geers, the health officer, to the Secretary:

Your letter received. Mr. C. Hegge came home from Omaha, Neb., January 10th, with a suspicious eruption. The railroad people ordered their local physician, Dr. Brownfield, to see the case, who pronounced it not smallpox.

The town board of health ordered me to investigate. I pronounced it smallpox and used all precautions. The railroad car was fumigated. Vaccinated people in the house the next day, and many others. The house being isolated no trouble was found in quarantining, except that at first people doubted my diagnosis. In a few days letters came from Omaha advising the patient that two fellow-clerks, a lady and gentleman, had smallpox in Omaha, and that he should use due precaution not to infect other people. Of course that convinced them that I was right. The case ran the usual course, only a few places being confluent; highest temperature, 104.4. All rooms, etc., were fumigated, washed, newly papered and everything done to kill the germs of smallpox, and quarantine was released March 15th. No other cases in this vicinity.

Hoping that this will be all that you require, if not, let me know what else you want to know and oblige.

One case; recovered.

SCOTT COUNTY.

Under date of May 4th, Dr. W. W. Bailey, of Le Claire, reported to the Secretary of the State Board of Health that they had quarantined three suspected cases of smallpox—expressing the belief, however, that the cases were aggravated cases of chicken pox. The Secretary laid the fact before Dr. Matthey, Davenport, a member of the State Board, and suggested that he make a personal investigation. This was done, and on returning the Doctor reported to the Secretary, May 8th:

In compliance with your request, have made an investigation of the reported smallpox cases at Le Claire, Iowa. Dr. Cantwell, of the Davenport board of health, was kind enough to accompany me and offer his valuable experience. Dr. Bailey, health physician of Le Claire, told us he had

treated only one case, which he had considered in the beginning, chicken pox. Later he had ordered quarantine for cases that had been reported by other physicians as true smallpox.

In company of Drs. Cantwell, Bailey and Gamble, we visited in all fifteen cases, of which two are completely recovered. For the last ten days no new cases have been reported. All cases are of mild type.

We have traced the origin of the infection at Le Claire, Iowa, to a man by the name of J. F. Twiesel, who had worked as a river hand in Louisville, Ky. Soon after his return in March, he showed symptoms of the disease, and thus became the source of the infection at Le Claire, Iowa.

May 11th, Dr. Matthey wrote to the Secretary: "The authorities of Le Claire still claim that there is no smallpox in that locality, and are thus complicating matters. I would ask you to send Dr. Shrader, for the State Board, to decide the nature of the disease."

This request by Dr. Matthey was communicated to Dr. Shrader, who was not able to go at the time, and later thought the visit unnecessary, as the mayor, Mr. F. P. Schworm, was doing all he could by way of quarantine to prevent the spread of the disease.

June 10th Dr. Matthey reported to the Secretary, one case of smallpox in Pleasant Valley township. He says:

I have just returned from Pleasant Valley, where I went to investigate a case of smallpox, by order of the board of health of the city of Davenport, in company with Dr. Preston, health physician *pro tem*.

The patient, a waiter girl of eighteen years, employed in the Atlantic Hotel of Davenport, probably contracted the disease from another girl of Le Claire.

The girl is now living with her parents near Pleasant Valley, on a farm. Proper quarantine has been established and no further spreading is feared. Since my last report, two new cases have developed in Le Claire. This makes a total of seventeen cases in Le Claire.

On the 18th of June Dr. C. H. Preston, City Physician *pro tem* of Davenport, wrote the Secretary as follows:

At the suggestion of Dr. Shrader I wired you this morning of the case of smallpox at Pleasant Valley, on the river, ten miles from Davenport and four from Le Claire. This case (Mary Zeibel) and another (Lincoln W. Pope) were diagnosed "chicken pox," and allowed to leave the city without any report to the board. This was very unfortunate, though somewhat excusable, at least in the Pleasant Valley case, which is mild. The young man had been attending the girl; he had been in Le Claire (an infected point), and so the source is plain.

Many must have been exposed by them, both here, on the train and hacks, and in Iowa City. (The Pleasant Valley home is outside the village.)

To our knowledge no other case has yet developed, this being the eleventh day since this city was last exposed. There is no smallpox in Davenport at present, but the outlook is grave.

Three localities—the Atlantic hotel and the Severin and Kinnian boarding houses—were infected. This board is vaccinating those exposed, has fumigated the apartments, and is restricting communication with the localities named, stopping school attendance.

The cases came to our knowledge too late for effective house quarantine.

It appears to me that this occurrence emphasizes the necessity for a new regulation by all local boards, if not by the State, something like this:

Every case of general vesicular or pustular eruption (chicken pox or other), and every case of throat disease with exudations, shall, as soon as reported, be investigated as to its nature by the physician to the local board.

On June 30th Dr. Preston reported a case in Davenport. He says:

Another case of variola (discrete), a Mrs. Brundage, cook at the Atlantic house, came to light yesterday afternoon, and she was at once taken, with her little child, to the pesthouse. The Atlantic house was placed under strict quarantine last night. The proprietor had willfully concealed knowledge of the case until it was accidentally discovered on the sixth day of the eruption, he answering "all well" to our daily inquiries since the 12th inst., when the cook and other help exposed to the Pleasant Valley case were vaccinated. If such willful concealment is not already, it certainly should be made, a penitentiary offense.

Total number of cases reported in Scott county: Le Claire, 17; Pleasant Valley, 1; Davenport, 1—19.

No deaths.

SHELBY COUNTY.

The only report the Secretary has received from this county was from Dr. J. A. McKlveen, who, as is shown by the report of Audubon county, visited the following points from Audubon and Kimballton. The following refers to the cases in Shelby county:

From Kimballton we drove over to Elkhorn, in Shelby county. Here I saw Doctor Soe and one of the Trustees of the township.

Doctor Soe went with me out one-half mile in the country to Jens Clemenson's. There were four cases in this family, one well marked, the others had been mild, but clearly mild cases of smallpox. The trustees informed me that they were not organized as a board of health, but would do so at once. Dr. Soe had that day received from you board of health literature, and instructions, and I left the trustees other instructions for their guidance, and I think they will understand the matter now and will do the best they can. They are all Danish, but seem to want to do the right thing when they know how.

From Elkhorn I went to a family by the name of Jensen, where I found five cases. I only looked at two; it being about midnight, and the family all in bed, I only asked to see two of the worst, as I thought they would decide for the balance. These cases were well marked cases of the discrete variety. They were taken sick on the 17th of March. All of the cases are well quarantined, and the proper means will be taken for disinfection. It looks now as if they had the disease under control, as there seem to be no new cases developing in this section.

All the cases in the southern part of Audubon county, and in Shelby county, are traceable to the Wright family in Kimballton. The cases in the town of Audubon, one or two in number, are traceable to Hamburg. These were the first cases in this county. I did not see this case as it was released from quarantine; it was not thought necessary. All of the cases I have seen this year, thus far, are of the same variety, and very much alike in appearance and the course they run.

Total number of cases in Shelby county, nine; all recovered.

WARREN COUNTY.

The first information of the presence of the disease was a letter from Dr. G. E. Hatfield, of Lacona, dated November 24th, reporting three cases. Doctor McKlveen was notified and visited the place and confirmed the diagnosis, and assisted the local authorities in establishing quarantine. The following extract from a letter from Doctor Hatfield, dated November 27th, shows the efficiency and promptness of the local board of health:

The disease was brought here from Nebraska City, Neb., and the first case was treated by a doctor who called it chicken pox, and he was running around town here before the scales were off. I examined him on the street and had him quarantined. They refused to respect the quarantine and he was fined \$20 and costs and made to return to his house by some citizens. We are trying to establish a strict quarantine, and we have quarantined several cases that have been exposed, for a period of two weeks, when, if they do not take the disease they will be released.

The local board is doing all in its power to prevent the spread of the disease, and I am vaccinating every one that I can.

November 30th Dr. B. F. Price, of Milo, reported a case in Belmont township, about six miles west of Milo. Strict quarantine was established and maintained, not only of the party affected, but of those exposed, and vaccination was observed quite generally.

December 20th R. E. Vansyoc, Township Clerk, reported a case of smallpox in Otter township, which was promptly quarantined.

February 17th Lon Durin, City Clerk of Milo, reported four cases within the corporate limits of Milo. Dr. G. E. Hatfield, in a final report, gave the following interesting facts:

In replying to your letter regarding the smallpox in this county, I will say, so far as I know, there were about twenty-nine cases. It was brought here by one Myron McCartney, who had been visiting in Nebraska City, Neb. He was not quarantined until he got able to be around on the streets, it having been diagnosed as a case of chicken pox by the attending physician. I saw him on the street and reported to the local board of health that I believed the case to be smallpox, and it was quarantined as such. All the cases can be traced to this one McCartney. He at first had a Daugherty girl doing house work when he was taken down sick. The Daugherty girl left and he got another girl by the name of Walchter. Both these girls were taken down with smallpox after they quit work at McCartney's, and infected their own families.

All the others who had it worked at McCartney's husking corn, or were infected from their being in the same family.

All the cases were of a mild type and there were no deaths. The following is a list of the cases:

Myron McCartney and wife, Thomas Walchter and six children, J. C. Ferickson and six children, Thomas Bell and two children, Ben Willis and wife, six children of David Daugherty, A. T. Ralph, Jasper Sargent and mother and John Sargent.

Three of the cases are left badly pock marked, two others show a few marks and the remainder are not marked so as to be noticeable in conversing with them.

All the cases were of the discrete variety except one, which was confluent on the face and upper portion of the body. Only three of the cases had been vaccinated previous to the present outbreak, and two of these had not been vaccinated for thirty years and the other for thirteen years. Sixteen cases were vaccinated after exposure, and in eight cases the vaccination took just about the time they were taken down with the disease, but even at this late date it has greatly modified the disease.

Summary: Lacona, 29 cases, Milo, 4; Belmont township, 1; Otter township, 1; total 35. No deaths.

WASHINGTON COUNTY.

April 18th Dr. J. C. Shrader, of Iowa City, sent to the Secretary the following communication respecting smallpox in Washington county:

Last evening I was called to Wellman, Iowa, on the line of the Burlington, Cedar Rapids & Northern railway, some forty miles south of here. Visited the place this morning, and in company with the health officer, who is the medical attendant, saw the patient, who is domiciled about one-fourth of a mile south of town. Found a man 21 years of age, who has been recently discharged from the service of the United States, and who has spent the winter in Cuba. On being mustered out, he came to Savannah, Ga., was there some days—could not learn definitely just how long—then

went to Tennessee for a short time, then stopped in Illinois one day, and not feeling well, started to his friends in Wellman. Was sick when he arrived a week ago to-day; after going to his friend's house went to bed and has been there and in bed ever since. Dr. Gardner was called that night about 9 o'clock, found him broken out with a well-defined eruption, but failed to diagnose the case. Next day he and Dr. Smith saw the case, but could not name it. He had been visited every day since, but the doctors still did not make a diagnosis.

I found the patient, Lee Fletcher, in an upstairs room. He was covered with pustules commencing to dry, some few desquamating. I had no trouble making a diagnosis. I saw the township clerk, and he at once established a lawful quarantine, called on the Mayor of Wellman, Mr. Moore, who called his board of health together and passed an efficient ordinance, so now they are properly equipped and on the alert. Of course there is considerable excitement in the town and surrounding country. I will keep you advised of the state of affairs.

Later information from Mayor Moore and the health officer, Dr. Gardner, shows that this was the only case in the county. He recovered.

WAYNE COUNTY.

January 10, 1899, Dr. O. A. Cover, health officer of Seymour, reported that they had in the town of Seymour a case of smallpox rigidly quarantined and a suspected case under surveillance. The subject was a young man from Nebraska City, and when he reached Seymour he was all broken out.

January 13th, Dr. McKlveen, of Chariton, wrote the Secretary,

The mayor of Seymour, Wayne county, wired me on Wednesday to come down at once and look after smallpox.

I left Chariton on the 10:55 train and went via Ottumwa. I had to wait at Ottumwa for the Milwaukee until 2 o'clock and did not get to Seymour until 4:30 in the morning. I then lay down for a couple of hours sleep. The local board was called together in the morning, and matters of quarantine, etc., was discussed and the board and local physicians insisted that I must see the cases that were supposed to have the disease, as none of the doctors there had ever seen a case of smallpox. The health physician, Dr. Banning, went with me. There were a couple of cases in his own family, that were quarantined as suspicious, and he first took me there. I could not decide these cases to be smallpox. If they are, they were not sufficiently developed to make a diagnosis. I advised him, however, to continue the quarantine for a sufficient time to determine fully.

The next case that I saw was a daughter of Mr. John Monteith. This is a girl about 16 years of age. The history of the case is that of smallpox. The eruption is fairly typical, though she is beginning to desquamate, the vesicles being dry and scaling off. The girl has never been much sick, and was sitting up reading when I went in. My decision was that this is a mild case of Nebraska City smallpox. I have seen many cases of smallpox

in the last thirty-five years, but the Nebraska City epidemic is the mildest I ever saw. Yet I feel sure that it is the disease. Nothing else would "fill the bill."

The source of infection is Nebraska City. The citizens are badly frightened, and quarantine is thorough. I only found one case in Seymour.

Dr. C. W. Banning kindly furnished the Secretary with the following detailed history of the disease in Wayne county, including Seymour, Genoa and Monroe townships:

In John Monteith's family, ten cases—three had been previously vaccinated; five cases in Frank Stroud's family; seven in William Shepherd's family; two in the family of Thomas Shepherd, one of whom had been vaccinated; two cases in Scisney's family; one in the family of James Stephens; one in that of James Willy, and four in William Gordon's family—one death, Laura Gordon; two in William Monteith's family, and one in each of the following families: Sagers, H. H. Shepherd, A. D. Browning and J. C. Phillips. The last one had been vaccinated. The disease was mild in most cases. We isolated and quarantined and soon had it under control. The reason it got so scattered was that the first cases were so mild that no physician was called and they were not quarantined. The source of infection is Nebraska City.

Whole number of cases in Wayne county, thirty-eight; one death.

WINNESHIEK COUNTY.

Mr. C. C. Brown, clerk Orleans township, reported seven cases—father, mother, and five children, all in one family. One, a young man 20 years old, had the disease quite severely, and was considerably disfigured. All recovered.

The cases may be tabulated as follows:

COUNTY.	No. cases.	No. deaths.
Appanoose	2	None.
Audubon	6	None.
Cedar	5	None.
Fremont	51	None.
Henry	2	None.
Howard	46	None.
Johnson	3	None.
Jones	24	1
Lee	1	None.
Scott	19	None.
Shelby	9	None.
Warren	35	None.
Washington	1	None.
Wayne	38	1
Winneshiek	7	None.
Total	249	2



III.

VACCINATION.

The fact that two hundred and forty-nine cases of smallpox occurred in Iowa from November 18, 1898, to June 30, 1899, is sufficient proof that smallpox still possesses its contagious properties, and needs only subjects who are susceptible, and conditions that are favorable to fill the land with sickness and demoralization.

The fact that once in thousands of vaccinations disease, or even death, apparently results from inoculation with vaccine virus, should on no account lead to the neglect or abandonment of so wise and harmless a measure of protection.

The effort is being industriously made to prove that vaccination does not protect. Where such failure results, it may be safely laid to improper method or material—to mistaking local irritation for systemic inoculation.

Dr. Bizzozzi, in a recent lecture delivered at Rome, recalled strikingly to his audience the success of vaccination in Germany. He said:

Germany stands alone in fulfilling, in a great measure, the demands of hygiene, having in consequence of the calamitous smallpox epidemic of 1870-71 enacted the law of 1874, which makes vaccination obligatory in the first year of life, the revaccination obligatory at the tenth year. What was the result? With a population of fifty millions, having in 1871 lost one hundred and forty-three thousand lives by smallpox, she found by her law of 1874 the mortality diminished so rapidly that to-day the disease numbers only one hundred and sixteen victims a year. These cases, moreover, occur almost exclusively in towns on her frontier. If it were true that a good vaccination does not protect from smallpox, we ought to find in smallpox epidemics that the disease diffuses itself in the well-vaccinated no less than in non-vaccinated countries. But it is not so. In 1870-71, during the Franco-German war, the two peoples interpenetrated each other, the German having its civil population vaccinated optionally, but its army completely vaccinated, while the French (population and army alike) were vaccinated perfunctorily. Both were attacked by smallpox. The French army numbered twenty-three thousand deaths by it, while the

German army had only two hundred and seventy-eight, and in the same tent, breathing the same air, the French wounded were heavily visited by the disease, while the German wounded, having been vaccinated, had not a single case.

The rules of the State Board of Health, respecting the vaccination of pupils attending the public and private schools of the State, are as follows:

RULE 1. Every person entering any public or private school of Iowa must give satisfactory evidence of protection by vaccination.

RULE 2. The fact of vaccination and protection must be entered with each name on the school record, and on transfer and promotion lists.

Order of Vaccination.—At a meeting of the State Board of Health, February 2, 1894, for the purpose of preserving and improving the public health, and of preventing the spread of the disease known as smallpox, the following rules and regulations were ordered:

First.—All persons in this State over the age of one year, who have not been vaccinated, or who in the opinion of the local board of health of the district or jurisdiction in which such persons reside or are found, do not furnish satisfactory evidence of protection from smallpox, are hereby ordered to be vaccinated.

Second.—Local boards of health and all officers who compose said boards, and all sheriffs, constables, city marshals, and police officers within their respective jurisdictions, are hereby directed to enforce the foregoing order as soon as practicable, and so far as said order shall apply to the pupils of any public or private school or to the teachers thereof. The officers of the school district in which such school is held shall also require its enforcement.

The statute, chapter 16, title xii, section 2572, says:

Local boards of health shall obey and enforce the rules and regulations of the State Board; and peace and police officers, within their respective jurisdictions, when called upon to do so by the local boards, shall execute the orders of such board.

It is the *duty*, under the statute, of local boards of health in city, town or township, to obey and enforce the rules and regulations of the State Board respecting the vaccination of school children as much as respecting quarantine or the abatement of nuisances, and a failure to do so makes them guilty of malfeasance in office; morally, if not legally, liable for all damages that may result from such neglect or failure, and entitled to the condemnation of the public.

As to the right to require such a measure of protection, the Hon. Milton Remley, Attorney-General, says:

It is claimed that compulsory vaccination is an invasion of the person of the individual. People submit to laws imposing burdens in the form of taxation and restraint upon their conduct or action with comparative equanimity,

but when the enforcement of the law touches their person they are disposed to consider it a personal indignity. In such cases resentment and indignation often arise to the exclusion of reason and judgment. The power of the State to require all persons to be vaccinated, when the necessity therefor arises, is the same power as that exercised when whole blocks of buildings are torn down or blown up to stop the spread of a conflagration. It is the same kind of power as that which arrests and confines an insane person, or one who, for any cause, is a menace to others. It is called the police power of the State. "Public safety is the supreme law," is a maxim left us by the Romans. In times of danger to the public all things must yield to the demands of public welfare. No one having the smallpox would be permitted to parade the populous streets, spreading contagion everywhere. If under no statute law he could be restrained, he would be restrained by force; his life even would be taken, if necessary, under the law of self-protection or public safety, which is instinctively recognized by every human being.

The power to restrain one already infected with the disease, and the power to compel one to do an act which will prevent him from becoming infected, are one and the same—only differing in degrees.

The power of the State to require all persons to be vaccinated, when danger threatens, has not been directly determined by any court, to my knowledge, except in the case of *Morris v. City of Columbus*, by the Supreme Court of Georgia, which was decided a little more than a year ago. The constitutionality of the law was upheld by the court in a very able opinion, in which the principles of law are clearly stated, and the authorities are cited and reviewed. Other courts have upheld laws involving the same principle and powers, but space will not permit me to review them. It will well pay anyone interested in the subject to read the *Morris* case. It is reported in 30 S. E. R., 850.

The State of Iowa has not authorized the city councils to determine when the necessity arises for vaccination of the public generally, or the people of a city, as has the state of Georgia. Nor has it empowered school boards to require the vaccination of the pupils as have Pennsylvania and some other states. The duty of determining what is necessary to be done to preserve, to protect public health, and when it is to be done, has been intrusted by the legislature to the boards of health, State and local. From the necessities of the case, such matters must be left to the local authorities to a large extent. It is competent for the legislature to clothe boards of health or town councils, or whatever agents may be selected, or by what name they may be called, with power to take whatever steps the emergency or conditions demand, to protect the public health. The legislature of this State has given this power to the boards of health, and I am thoroughly convinced that every reasonable order made by the boards of health will be upheld by the courts, even to the extent of requiring all persons not immune, in a community threatened with the dread scourge, to be vaccinated. The reasonableness of any order depends, of course, upon the necessity for it, proximity of the danger. Many considerations enter into the problem of what is reasonable. Care should, in all cases, be taken not to exceed the bound of reasonableness. But when the necessity arises the matter should

be taken hold of kindly, but with a firm hand and in a heroic manner, remembering that "*salus populi suprema est lex.*"

Great changes have occurred within the last few years in regard to the virus used and the methods of its production and application.

The following paper, by Richard Slee, M. D., of Swiftwater, Pa., read at the sixth annual meeting of Associated Health Authorities of Pennsylvania, at Harrisburg, February 24, 1899, is reprinted from the *Philadelphia Medical Journal*, April 15, 1899, and fairly represents the intelligent methods, at present, recommended as insuring safety and successful results. The reprint and cuts have been kindly furnished us by the author and publisher.

MODERN METHODS IN PRODUCTION OF VACCINE VIRUS.

Early in the spring of 1893 Dr. Benjamin Lee, Secretary of the State Board of Health, prophesied an outbreak of smallpox in this and adjoining States, tracing up the advancing wave from its foci in the southeastern States, where it has been lingering since February, 1897.

Events are showing the clearness of his judgment and foresight. Reports are flocking in from all over the country, telling not of isolated cases, but of large areas where the disease is epidemic. January 18th, Dr. Probst, Secretary of the Ohio State Board of Health, reported there had been 668 in that State. The United States Marine-Hospital Service reported 1,925 cases, with thirty-six deaths, between December 1, 1898, and February 10, 1899, and I believe we may safely accept the estimate made in the editorial columns of the *Philadelphia Press*, February 18th, of 3,000 cases between January 1st and February 10, 1899.

The disease is spreading with alarming rapidity, and the remarks of Sir R. Thorne, in his report to the Local Government Board of London: "That the year 1899 may see an epidemic of smallpox such as has been unknown to the present generation," while applied to the English condition, may be properly used to express the situation on this side of the ocean.

What is the cause for the recrudescence of this dread disease? To one who has followed its course it is apparent that several factors are at work.

After traceable importation from Cuba the disease made its appearance in epidemic form in the mountains of Virginia, Tennessee, Georgia, Alabama, and neighboring states, among the great unwashed and unvaccinated class of miners and mountaineers, mostly of Negro origin. Its exportation from thence is easily traced; for example, the outbreak among the waiters at Put-in-Bay, or more recently its appearance among the unvaccinated recruits at Forts Niagara, N. Y., McHenry, Md., and elsewhere. The recruits in question had been lodged in the Imperial hotel, at Rochester, N. Y., while awaiting transportation to their various camps, and while so detained were exposed to infection by a concealed case of the disease in one of the waiters. Returning soldiers have also spread the germs broadcast, as expected, and the brunt now falls with special severity upon those sections where neglect to enforce vaccination has prepared an appropriate field.

Smallpox is also rife in certain districts where anti-vaccinationists are in force, and where they are now reaping the well-seeded and carefully nurtured harvest. With the condition now existing in the larger well-vaccinated cities, such as Philadelphia, New York and Chicago, with their tremendous, crowded, often ill-housed and ill-fed population, exposed in every twenty-four hours to more direct contagion, due to the vast flowing and ebbing tide of visitors, than would be an ordinary country town in a lifetime, places where one would expect an epidemic, it does not exist, but it does among the scattered country population to an alarming extent. As an example of what can be accomplished by thorough vaccination, the report of Captain and Surgeon R. S. Woodson, February 8, 1899, shows that in three months the disease, which has been epidemic for over twelve years in the district of Holguin, Cuba, has been completely exterminated by the vaccination of over 10,000 people and successful treatment of over 12,000 cases of smallpox. Not a single soldier contracted smallpox, though soldiers did guard duty at the lazarettos; all had been thoroughly vaccinated before reaching Cuba.

Aside from neglect to enforce vaccination, there exists in many minds a marked timidity in voluntarily submitting to protective inoculation with the virus of cowpox. This fear, as a rule, is based upon exaggerated reports in regard to unfavorable or unpleasant results either accompanying or following vaccination. Without doubt a few persons have suffered from mixed infection following vaccination. While this cannot be laid entirely at the door of protective inoculation with cowpox, save in rare instances, still the fact that such events may follow or accompany vaccination has led many competent workers in this country and abroad to endeavor to obtain a vaccine free from all extraneous organisms, which will produce cowpox pure and simple, without any inflammatory or septic accompaniments. I want to emphasize in the strongest possible manner the fact that the investigations which have led to the present standing and methods of producing vaccine virus (I refer to the so-called glycerinated pulp-vaccine) are directly the result of a number of independent workers, many of them of the highest possible standing in scientific work in no wise connected with any vaccine-producing establishment or with any mercantile interest in such establishments. Papers on the subject have been published in this country by Sternberg, Reid, Weaver and Huddleston; in England by Copeman, Kent, Warlmount, Crookshank, Blaxall, Klein and others; in India by King, Simpson and Harvey, the last in 1868; in France by Fouque, Chambon, Menard and others; in Germany by Leonhard Voight, Straus, Badstubner and Fleischman; in Japan by Kitasato (that gifted and brilliant Japanese to whom the world owes, in a very great measure, the discovery of diphtheria-antitoxin); Mumenno and Ogata; in addition I have notes of over 150 papers on the subject from all over the globe.

While the calf, or, in fact, any animal, constitutes the soil upon which to grow successive crops of vaccine virus, it is an utter impossibility to exclude or prevent contamination with many organisms. The reason for this is easily explained. Many organisms are more or less persistent inhabitants of all animal surfaces; they are found not only on the surface of the skin, but deep down beneath the superficial layers, and in the base of the hair-follicles. This is the reason so much care is necessary in the

preparation of a patient for an abdominal operation, and why even with twenty-four hours' careful preparation and the use of strong antiseptic agents there is sometimes failure to sterilize the field of operation, and as a result infection of the wound follows. Halstead, Keen, and many other prominent surgeons in this country and abroad, appreciating this difficulty, wear thin sterilized gloves while operating.

In the animal there is such original infection many times multiplied, owing to the greater number of hair follicles, and also to habits which we cannot control. Should we succeed in saturating the surface of the skin with the stronger antiseptics and rendering it in a measure sterile, a successful vaccination could not be produced, as the vaccine organism is so readily destroyed by even the mild antiseptics.

With the most careful preparation of the calf the production of vaccine is begun with an infected skin, using the word infected to imply that the skin is not sterile. If a scratch is made sufficient to cause a little serum to flow, and at once a drop of this serum is transferred to a tube of culture-medium, and incubated for a few days, almost without exception there will result a luxurious growth of many organisms similar to those shown by Figure 1, which was made under the conditions just described. The majority of the organisms shown growing here are harmless, but there are several present which bear a close resemblance to the pus-producing varieties; the only way to decide this is to test them on some susceptible animal. To every ordinary appearance they are pus-producing organisms. A culture taken from your own arm, however, would probably show a similar condition.

Starting with an infected skin, it of necessity follows that the cowpox vesicle will be infected. Should success attend the effort to destroy the majority of organisms in the beginning, those undestroyed would reinfect the wound within a few hours, and if they did not, exposure to the air of the stable would cause the vesicle to swarm with many varieties of micro-organisms in a short time.

It being impossible to produce a vaccine free from contamination, those germs present must be destroyed or rendered harmless. The one agent which has given the most satisfactory results in all hands is chemically pure glycerin. Vaccine virus stored in glycerin for three or four weeks is rendered practically sterile as far as extraneous organisms go. Glycerin is a very mild antiseptic agent, still its power of destroying germs may be proven by adding to some pure glycerin virulent cultures of any pathogenic organism and making cultures from week to week of this mixture. The cultures rapidly die out and the few organisms that may continue to grow do so under such unfavorable conditions that they rapidly lose their pathogenic attributes and are without significance. Dr. George H. Weaver, in his article "Glycerin as a Bactericide," in the *Journal of the American Medical Association*, December 26, 1896, published the following tables of results, which I have verified many times. He found that pure cultures of the following organisms added to glycerin were destroyed as follows:

FIG. 1.

Streptococcus aureus. Dead in five to twenty days.

Staphylococcus pyogenes. Dead in five days, even in large quantities.

Bacillus mallei. Dead in two days.

Bacillus subtilis. Dead in four weeks.

It will thus be seen that the pus-producing organisms are very rapidly destroyed by the action of glycerin. The use of glycerin as a medium for vaccine virus is not by any means a recent thing. It was brought prominently before the medical world in 1891 by Copeman, in a paper read before the International Congress of Physiology and Hygiene, in London. So far back as 1850 an article was published in the London *Medical Times* by R. Cheyne, on the preservation of vaccine-lymph by the use of glycerin, and in 1853 he exhibited to the Presidents of the Royal College of Physicians and Surgeons, a child that had been successfully vaccinated by lymph stored in glycerine for six months. In 1869, Muller, of Berlin, followed up these experiments, and Dr. Stephen Mackenzie used glycerinated lymph in the London epidemic of 1870-71 with marked success. In 1882, Doctor Warimont patented this process in England.

In this connection I will read a recent letter from Dr. Joseph H. Raymond, professor of physiology and hygiene in the Long Island College Hospital of Brooklyn, as it refers to what I believe was the first introduction of fluid lymph into this country. He writes:

"In March, 1868, I reached Paris, where I found that smallpox was quite prevalent; not having been vaccinated in some time, I went to Lenoir's office, where I found him and a calf with the vaccine vesicles well developed. He took the lymph from the vesicle and vaccinated me, making three scarifications on each arm. I asked him to put some of the lymph up for me in capillary tubes, which he did in my presence, and wrapped them for me in cotton and packed them in a box. This I sent to my old family physician, Dr. George Marvin, of Brooklyn. When he received it he vaccinated a

number of carefully selected primaries, and the lymph which he obtained from these children was much sought after by the Brooklyn doctors; many of them came to his office for it. The lymph was of Besurgency stock.

Sincerely,

J. H. RAYMOND.

It was not until about 1890, however, that the bactericidal action of glycerin was prominently brought before the medical world. It received great impetus from a paper, by Chambon and St. Yves Menard, appearing in 1892; and again from a paper read by Leoni before the Medical Congress at Rome, in April, 1894.

The following plates have various growths perceptible. Figure 2 was made from the serum or so-called lymph generally used in making points or quill-slips; and Figure 3 was taken from the pulp which is now so universally used in preparing glycerinated vaccine. In these tests an equal portion of each material from the same calf was used, and it makes a picture which illustrates what is claimed—that the serum collected for vaccine and also the pulp contain about an equal percentage of organism, of

FIG. 2.

exactly the same variety. As both pulp and serum are equally infected for all practical purposes it is well to use that portion of the vaccine-vesicle which possesses the greatest vaccinating power.

The exhaustive investigations of Chambers, Copeman, Straus and others have conclusively shown that the greatest percentage of vaccinating material is contained in the cheesy, underlying mass called the pulp, which seems to be the natural culture bed for the cowpox organism.

I cannot better describe the modern method of preparing glycerinated pulp-vaccine, than to quote from Dr. S. Monckton Copeman's article, entitled "The Natural History of Vaccinia," read before the Royal College of Physicians of London, in May, 1893. He describes the process as follows:

FIG. 3.

The preparation of the calf.—A calf of suitable age, about 3 to 6 months old, should be kept in quarantine for a week, after which, if found to be quite healthy, it may be removed to the vaccinating station. It is there placed on a tilting-table and the lower part of the abdomen, reaching as far forward as the umbilicus, having been shaved, is thoroughly washed with a solution of carbolic acid and then rinsed with sterile water and dried with soft sterilized towels.

Inoculation of the calf.—With a sterilized sharp scalpel, incisions parallel to the long axis of the body are made on this clean-shaven area. The depth of the incision should be such as to pass through the epidermis and to open the rete Malpighii, if possible, without drawing blood. As these incisions are made, glycerinated calf-lymph, which by examination has been proved to be free from extraneous organisms, is run into them by means of a sterilized blunt instrument, and the point of the scalpel is also from time to time dipped into the vaccine emulsion.

Collection from the calf.—After five days, or 120 hours, the vaccinated surface of the calf is first thoroughly washed with warm water and soap, rubbed over it by the clean hand of the operator, and finally the whole area is cleansed with sterile water. The remaining moisture is then removed by sterilized sheets of blotting paper. The vaccinated incisions will now appear as lines of continuous vesicles raised above the surface, each line separated from its neighbor by about $\frac{1}{4}$ -inch of clear skin. Any crusts which appear in the vesicular lines are picked off with a blunt sterilized instrument. The vesicles and their contents are then removed by means of a sterilized Volkmann's spoon and transferred to a sterilized bottle of known weight. By going over the lines only once with the spoon it is quite easy to remove the whole of the pulp without any admixture of blood. The abraded surface is carefully washed and may be dusted with fine oatmeal

or starch and boracic powder. Subsequently the calf is transferred to the slaughter house and the carcase is examined by the veterinary surgeon, who forwards a certificate of its condition. Should this not be satisfactory the vaccine pulp from the animal is destroyed.

Preparation and glycerination of the lymph-pulp.—The bottle containing the vaccine-pulp is taken to the laboratory and the exact weight of the material ascertained. A calf vaccinated in this way will yield from 18 to 24 grams, or even more, of lymph-pulp. This material is then thoroughly rubbed up in a sterilized mortar or in a mechanic triturating machine. When it has been brought to a fine state of division it is mixed with six times its weight of a sterilized solution of 50 per cent, chemically-pure glycerin in distilled water. The resulting emulsion is then transferred to small test-tubes, which are then aseptically sealed and should be stored in a cool place protected from light. When required for distribution it is drawn up into sterilized capillary tubes which are subsequently sealed in the flame of a spirit lamp.

Bacteriologic examination of the lymph emulsion.—As soon as the vesicular pulp is thoroughly emulsified with the glycerin-solution agar-agar plates are established from it and after suitable incubation for seven days the colonies that have developed on the plates are counted and examined. Week by week this process is repeated and invariably the number of colonies diminishes with the age of the emulsion, until at the end of the fourth week after the collection and glycerination of the lymph-material the agar-agar plates inoculated at that time show no development of colonies. The lymph is then subjected to further culture experiments, and if these results of freedom from extraneous organisms are confirmed the emulsion is ready for distribution. The elimination of the extraneous organisms in our experiments has occurred with marked regularity at the end of the fourth week. The only exception to this rule arises when the lymph originally contained a considerable number of spores or bacilli of the hay-bacillus or bacillus mesoentericus. These organisms are very resistant to the action of glycerin, but if the precautions detailed are carried out in the treatment of the calf their presence may generally be excluded.

Duration of activity of glycerinated calf-lymph.—This varies in all probability with atmospheric conditions, with the fineness of division of the vesicle pulp, and, above all, with the condition of the calf itself. Some calves yield excellent lymph, others a poor lymph, and the problem is to determine the value of the lymph yielded by the given calf. A lymph which was collected and glycerinated July 13, 1897, has since been used at intervals of from twenty-four to thirty-two weeks after glycerination, for the vaccination of children. During this period sixty-one children have been vaccinated with this lymph in five places each, with a mean insertion-success of 98 per cent. Thus by the methods described glycerinated calf-lymph can be prepared which becomes freed from extraneous organisms, and retains full activity for ten months, and will, under favorable circumstances, continue to do so in all probability for still longer periods if necessary. In practice, however, there will, of course, be no reason for keeping lymph for such a period.

From the description which I have given, it will, I think, be obvious that the preparation and testing of glycerinated calf-lymph, properly so-called, is a matter requiring considerable skill and care. Sir Richard Thorne insists strongly on this fact in his introduction to our joint report, recently presented to Government on the administration of certain of the chief continental vaccine establishments. "In every instance," he says, "we found that the work of collecting, preparing and storing glycerinated lymph was carried out with the greatest care; a condition of scientific cleanliness was especially aimed at, and a laboratory fitted with bacteriologic and other scientific apparatus" always formed an essential part of the vaccine institution. The extent to which the desired end of freedom from extraneous impurity was attained depended largely on whether a first attempt to adapt an existing calf station or similar establishment to its new purpose had been maintained, or whether it had been abandoned in favor of an institution constructed especially for the purpose of that which

is in the main scientific laboratory work. Several of the stations which we visited are already under condemnation because of the difficulty of insuring that freedom from micro-organisms which should be aimed at during the preparation of the lymph supply; the Cologne station is one of the newest, and may well serve in its main feature as a type of that which should be aimed at. The condition of scientific cleanliness to which I have referred extended to such matters as the following: (a) the construction and administration of the stabling for the calves; (b) the means of washing or bathing calves before their vaccination; (c) the construction, cleansing, etc., of the operating rooms; (d) the cleansing of the vaccinated surface of the calf with germicidal preparations and sterilized cloths before collection of the lymph; (e) the use of clean sterilized outer garments by all officials concerned in the processes carried out; (f) the sterilization of all instruments, etc., employed; and (g) the admixture of the lymph-material or pulp with glycerin, its preparation and storage under conditions of laboratory freedom from extraneous organisms.

FIG. 4.—Culture from sample of glycerinated pulp vaccine, stored for 8 days, showing great diminution in number of colonies.

Until within a year or two the virus in greatest demand in America has been in the form of serum dried upon points or quills. There seems to be a peculiar association in many minds between the ivory point and clear, colorless serum. The fact is that the serum which exudes is the weakest portion of the vesicle in regard to its protective power. The serum is nothing more nor less than a vehicle, and if drawn one-sixteenth of an inch outside of the vesicle is absolutely inert; it does not possess any power of its own, as can be proved by simply filtering it through a Pasteur filter, which renders it inert. As the serum oozes up through the base of the uncovered vesicle it gathers the organisms of vaccinia in the same manner as it gathers up the other organisms present, and holds them in suspension till dried.

The use of this serum, with its low percentage of active vaccine principle has undoubtedly given many people a wrong sense of security. Its fail-

ure to "take" is accepted as evidence of immunity and no doubt gives rise to reported cases of vaccinated people contracting smallpox. The physician himself is partly to blame owing to his demand for colorless virus. The absence of color, which is produced by washing the base of the uncovered vesicles, and of necessity, removing the major portion of active vaccine, allows a clear, straw-colored serum to ooze up; this, when transferred to points, is so notoriously unreliable that many producers advertise their points as doubly or trebly charged with the serum from one, two, or three animals, which is in itself a confession of the inherent weakness of the clear serum. A pure cowpox will give practically 100 per cent of success in primary cases. It is not necessary to mix the product of several heifers to obtain this percentage.

To the unaided eye the clear straw-colored serum certainly appeals, but when it is under the microscope what do we find? Red blood-cells, leukocytes or so-called pus-cells, epithelia debris, and many micro-organisms; exactly the same findings as those obtained in specimens of pulp, perhaps not so great in quantity, but there nevertheless. Of the many objects present, however, the micro-organisms alone are of clinical significance, and the rapidity with which a single organism will produce its kind—literally untold millions—in a space of twenty-four hours, is well known. It is needless under these conditions to call attention to the absurdity of making comparative cultures of various products, as the organisms may increase or diminish in the several specimens under examination even during the time it takes to plate them. (I refer to dried lymph or unprotected fluid lymph.) In the glycerinated lymph they rapidly decrease in numbers. In conclusion, I compare the two forms of vaccine now in use, pointing out the advantages and disadvantages of each.

FIG. 5.—Agar plate inoculated with glycerinated pulp vaccine, 18 days old, showing total destruction by action of glycerin of all organisms which were present in crude pulp, as shown in Fig. 3

AS REGARDS LIFE OF THE VIRUS.

Glycerinated pulp-virus retains its activity for many months, increasing in power up to a certain variable point, being at its height at the end of two months or ten weeks from date of production.

Dried virus is most active when freshly collected and gradually loses its power, becoming inert as a rule in from four to six weeks from date of collection. Undoubtedly this is due largely to atmospheric influences.

SAFETY.

Owing to destruction or inhibition of any pathogenic bacteria which may be present, glycerinated virus offers the greatest measure of safety.

In dry form it is questionable if great danger exists; still if infection chance to be present there is no provision for its removal or destruction.

VACCINATING POWER.

The grinding and trituration of the pulp insures every portion of the liquid being of the same power. The principle shown in making tablet triturates enters into the manufacture and accomplishes this; therefore if active it will give practically 100 per cent of success in primary cases.

In drying virus on points or quills each point depends wholly on chance for its activity. It may or may not gather up enough active material to produce a successful vaccination, and as a result, 70 per cent of success would, I think, be a fair average.

I desire to call attention to the unpleasant accompaniments or results of vaccination and their cause. These unpleasant symptoms are as a rule local, and vary from a marked edema and erythema to actual ulceration and, at times, abscesses at site of vaccination or elsewhere. The reason for this may be readily understood by the following example: If we touch the skin with a red-hot pinhead the burn is of little account and heals promptly. Increase the size of the instrument to say a quarter or a half inch in diameter (which size scarifications are often made), and the destruction of tissue is considerable, and unless care is taken there results an inflamed wound, and, perhaps, an infected one, though the instrument used is absolutely sterile and also sterilizes the skin.

The same general rule applies to a cowpox vesicle. The greater its superficial area the greater danger there is of the crust or scab becoming detached or disturbed and as a result its base becoming infected. It must not be forgotten that pus-producing organisms normally inhabit the vast majority of human skins. All they require is a proper soil to become active, and this is furnished in the base of every normal cowpox vesicle.

In all therapeutic agents except vaccine there is a system of dosage. In other words, with few exceptions we do not think of giving as large a dose of medicine to a child as we would to an adult, yet some place as large a vaccine vesicle on the arm of an infant as they would on a man. Glycerinated vaccine-virus as now prepared is very concentrated. It bears the same relation to the old-fashioned ivory point or quill that morphia bears to the older forms of opium.

The same general rule regarding dosage applies to both, that the dose for a child should be smaller than that for an adult. We regulate our "dose" of vaccine by the size of the scarification, and it may be generalized as follows: From birth to about 5 years, a single scratch about one-eighth to one-quarter inch long is sufficient; 5 to 10 or 12 years, four lines crossing,

making a spot about one-eighth of an inch square, and for an adult, three or four lines involving about a quarter-inch square of surface.

One typical cowpox-vesicle the size of a small split-pea affords as thorough a protection as will a dozen.

Whatever form of virus you use, it is well to remember that the production of vaccine virus is not an exact science. We are not dealing with a fixed drug, but with a biologic product, in regard to which there are many unsolved problems. An active vaccine virus presupposes the presence of a living organism, whose length of life cannot be predetermined any more than can human life. The rule adopted by life-insurance companies of averaging is therefore the only one that can be employed here. It is one of the few medicinal preparations in which the results are visible, and it therefore impresses itself upon the observer as either good or bad, in a vivid manner.

The following from the *Medical Journal* is deserving of careful persual, placing, as it does, this subject of smallpox and vaccination, and their relation to each other, so forcefully, and yet so fairly as to be overwhelmingly convincing:

Although the medical profession all over the world, with but few exceptions, believes in the efficacy of vaccination both as a preventive of smallpox and as a means of mitigating its severity, yet the fact is notorious that there is a large, and it would appear an increasing, number of persons, especially in Great Britain, who profess to have no faith in the prophylactic properties of the measure. Within the past year the ground, as regards the merits or demerits of vaccination, has been so thoroughly gone over that it is difficult to imagine anything further remains to be said. However, the anti-vaccinationists are of a different opinion, and, proceeding probably on the principle that "continual dripping will wear away a stone," are as active as ever in prosecuting their campaign. This being the case, it behooves the upholders of the rite to display an equal amount of energy in proving by incontrovertible facts the wonderful benefits conferred on the human race by it. *The Edinburgh Quarterly Review*, published in June of this year, contains one of the most convincing articles on the subject yet written; indeed, as an argument in favor of vaccination its reasoning appears conclusive. The article in question commences by giving a lengthy history of vaccination and of the good accruing therefrom, a portion of which we will here quote: "In Sweden the population and the smallpox mortality have both been known year by year since 1774. Before vaccination the mortality from smallpox averaged 2,045 per 1,000,000. With permissive vaccination from 1802 to 1816 it was reduced to 480; during seventy-seven years of compulsory vaccination the mortality averaged 155 per 1,000,000, and for ten years ending 1894 it has been put down to two per 1,000,000. If Sir John Simon's estimate as to the smallpox mortality in Great Britain before vaccination, being 3,000 to 5,000 per 1,000,000, be accepted as fairly accurate, and if we compare it with the mortality for the ten years ending 1894, we find that for ninety-nine people who died of smallpox in the eighteenth century, only one dies now. * * * The two conditions, a crowded and a mobile urban population, are those which chiefly favor the spread of smallpox. These conditions are present in the

large towns of the United Kingdom; they are much more frequent now than they were fifty years ago, and yet the mortality from the disease has everywhere greatly diminished. * * * In Prussia vaccination has been enjoined, and revaccination has been compulsory in the army since 1874. The general mortality has been reduced to seven per 1,000,000, and the army has had no smallpox mortality for years."

In other countries in which vaccination is in force the decrease of smallpox is equally well marked; in truth, the evidence in support of vaccination is everywhere overwhelmingly strong. How, then, does it occur that there is so great a resistance to its performance? The first in the category of its opponents are the cranks and faddists, that class of persons who, either for the sake of personal notoriety or because they possess the spirit of contrariety, are willing to overturn anything and everything. Next in order come their followers, the ignorant, those people who are ever easily led astray by a new doctrine, and who, never having experienced the fearful ravages brought about by a severe epidemic of smallpox, simply do not believe in its virulence. It should, nevertheless, in fairness be said that some of the prejudice against vaccination must be attributed to faulty administration in times past. Now that this cause of complaint has been removed the statement may be made without fear of contradiction that nothing but good can come of vaccination. The anti-vaccinationists always make a strong point of sanitation, and declare that it is to efficient sanitation, and not to vaccination, that the doing away with smallpox is due. This contention, however, will not bear a close analysis. Those who have made a careful study of the matter say that there is no reason to suppose that smallpox is ever developed out of defective sanitary conditions. The disease is as contagious in the rich man's dwelling as in the squalid home of the poor. A striking proof of the value of vaccination and of the unimportant part played by bad sanitation in the development of smallpox has recently been afforded in Manila. Assistant Surgeon Richie, Thirteenth Minnesota Volunteers, writing from that town, says: "April and May are the smallpox months in Manila. Two hundred and fifty deaths a month was not considered an excessive number, and this under ordinary conditions and not considered an epidemic. Since our occupation no such number has occurred, and owing to the untiring efforts of Major Bourne the mortality is almost nil. He told me a short time ago that there were but ten cases, all told, and most of them were varioloid, so that smallpox within our lines is under control. * * * Over 50,000 persons have been vaccinated, most of them several times, and the good work goes on."

Before leaving the subject of smallpox, and in view of its prevalence in parts of this country, we would again call attention to the importance of a correct diagnosis. Mistakes in diagnosis are sometimes made through the lack of a sufficient acquaintance with its lesions, and at other times owing to the type of the disease being modified by vaccination. Extreme care should be taken to ascertain with certainty whether the disease is smallpox. If it is, and is not recognized as such, the consequences to the neighboring community will probably be disastrous; for it must be remembered that, so far as spreading infection is concerned, the mild type of the disease is almost as dangerous as the severe, and, furthermore, if the cases are not isolated, will, in the course of a comparatively short period, develop into virulent confluent smallpox.

IV.

LEPROSY IN IOWA.

The following resolution was adopted by the House of Representatives February 3d:

Be it resolved by the House, That the Secretary of the State Board of Health be requested to investigate reported cases of leprosy near Graettinger, Iowa, to confer with the members of the State Board of Health so far as practicable, and report to the House at the earliest possible date, and not later than March 13th, with recommendations as to such legislation as he considers advisable.

In compliance therewith the Secretary made a personal investigation of the case and made to the House the following report: Some blood, scales, and exudate from the subject were furnished Dr. Eli Grimes, the bacteriologist of the Board, and the result of his examination fully confirms the diagnosis of leprosy:

Hon. J. H. Funk, Speaker House of Representatives Twenty-seventh General Assembly:

DEAR SIR—In compliance with a resolution passed by the House of Representatives March 3d, last, requesting me to investigate the facts as to alleged cases of leprosy near Graettinger, in Palo Alto county, and to report conditions found, and such recommendations as to legislation as may be desired necessary, I have the honor to report as follows:

I went to Graettinger March 8th, and was taken by Dr. Burdick to the residence of Mr. Peterson, in Long Island township, Palo Alto county, six miles due west from Graettinger. I found in the person of his daughter, Miss Carrie Peterson, aged nineteen years, a typical case of leprosy in an advanced stage. There can be no mistake whatever in the character of the disease. The mother died in a leper hospital in Bergen, Norway. She had been a leper two years when Carrie was born. She was taken from the home to the Bergen hospital when Carrie was two years old. Another older daughter was born to the same mother about two or three years before leprosy developed in the mother. I did not see this daughter. She was away from home. I was told that she was in good health, and showed no signs of the disease. I saw a recent photograph of her and there were no indications of the disease as shown by that.

Mr. Peterson is a farmer, is in good circumstances, has a very good frame two-story house, everything neat and clean. Carrie occupies a room upstairs. She does not eat with the other members of the family, and none enter her room, nor any of the dishes, clothing, towels, etc., used by her are used by any other members of the family. She does not leave the farm, and is thus quite well isolated.

There are four younger daughters by Mr. Peterson's present wife—an intelligent Norwegian woman. They were at home, and are all stout and healthy looking, and attend the public school, and associate with other children there.

The disease in the case of Carrie, I think, from the conditions now present, will terminate fatally within one year, or eighteen months at most.

I do not think any special legislation is necessary, as the State Board of Health, through the local board, can sufficiently protect the public health.

While leprosy is an incurable and most loathsome disease, it is but feebly contagious—so much so that several eminent authors doubt that it is at all so. Carefully collected statistics show while in Minnesota, Wisconsin, and Iowa there were a few years ago one hundred and thirty cases of leprosy, there are now in the whole northwest not to exceed twenty. There has been no segregation, and this dying out of the disease is because the conditions are in no way favorable for its propagation.

A special meeting of the State Board of Health will be held March 24th, when this subject will be laid before the members for such official action as they may deem proper.

I may be pardoned in this connection for stating that tuberculosis is a disease about which there is no question as to its contagiousness. More than five thousand persons die in Iowa from this largely preventable disease to every one that dies from leprosy!—more die from tuberculosis in a single day than has from leprosy since the State has had existence.

Would it not be more appropriate for our General Assembly to seriously consider the best ways and means of stamping out, or at least restricting the spread of this great white plague that is a menace to all our homes?

J. F. KENNEDY.

The following appeared in the *Iowa Health Bulletin* April, 1898, and contains all the facts known respecting this disease in Iowa at that date, and no other cases have been reported. So far as known there are no other cases in Iowa than the three above referred to, and there is no report to the Secretary as to whether they are still alive:

Since the investigation of the case of leprosy at Graettinger, we have received quite a number of letters from parties inside and outside the State. We have learned of two more cases which, with the Graettinger case, comprise all the cases we know of in Iowa.

The one in the person of Carrie Peterson, near Graettinger, is of the tubercular variety. There is one reported at Ridgeway, in the person of a Norwegian. He is said to be entirely fingerless and toeless. He has what is classified as the nervous or mutilans variety.

The other case is a Norwegian, 35 years of age, at Roland. His case is so far advanced that he is confined to bed. He is at the home of his parents. We have not been informed as to the variety of leprosy that he is afflicted with.

The Secretary reported to the Board at its late meeting, the Graettinger case—the only one known to him at that time—and the following resolution was adopted respecting such cases:

Resolved, That it is the sense of this Board that while we recognize the fact that the contagiousness of leprosy is an unsettled question, it is in our opinion best for the public health, that persons afflicted with well developed leprosy should be required by all local health boards to remain on their own premises, instead of being permitted to mingle with the general public.

We would be greatly pleased and helped in our work if health officers or physicians would report to the Secretary of the Board of Health with as much detail as possible any and all cases of leprosy they may know of in any part of the State. With a local health board in every city, town and township in the State, there is no reason why every case in the entire State should not be known and tabulated by the Secretary of the State Board.

[NOTE—It has been reported to the Secretary that Carrie Peterson died at her home the latter part of October, 1899.—SECRETARY.]

EMBALMERS' DEPARTMENT.

For years the State Board of Health, in the interests of the public health, in conjunction with the railway companies of the country, refused to allow the transportation of the bodies of persons dying of certain infectious diseases. This refusal has often been the source of great distress to friends whose loved ones had died away from home; or where, for any cause, the disinterment and transportation of such a body was desired.

Within the last few years there have been such scientific training among progressive undertakers, and such improvement in the methods and measures for sanitary embalming that it became apparent that under certain conditions these restrictions might be removed.

Scientific and intelligent embalmers demonstrated satisfactorily that the bodies of those dead of infectious diseases might not only be kept for an indefinite length of time, but so disinfected as to destroy all infectiousness. Recognizing this fact the "American Public Health Association," embracing the Dominion of Canada and the Republics of the United States and Mexico; the "Conference of State and Provincial Boards of Health of North America;" the "National Association of Railway Baggage Agents;" and various State boards of health, adopted the following rules for the transportation of corpses—the Iowa State Board adopted them in November, 1897:

RULE 1. The transportation of bodies dead of smallpox, Asiatic cholera, yellow fever, typhus fever or bubonic plague is absolutely forbidden.

RULE 2 The bodies of those who have died of diphtheria (membranous croup), scarlet fever (scarlatina, scarlet rash), glanders, anthrax or leprosy, shall not be accepted for transportation unless prepared for shipment by being thoroughly disinfected by arterial and cavity injection with a proved disinfectant fluid (b) disinfecting and stopping of all orifices with absorbent cotton, and (c) washing the body with disinfectant, all of which must be done by an embalmer holding a certificate as such approved by the State Board of Health. After being disinfected as above, such body shall be enveloped in a layer of cotton not less than one inch thick, completely wrapped in a sheet and bandaged, and encased in an air-tight zinc, copper

or lead lined coffin, or iron casket, all joints and seams hermetically soldered, and all enclosed in a strong, tight, wooden box. Or, the body being prepared for shipment by disinfecting and wrapping as above, may be placed in a strong coffin or casket, and said coffin or casket encased in an air-tight zinc, copper or tin case, all joints and seams hermetically soldered, and all enclosed in a strong outside wooden box.

RULE 3. The bodies of those dead from typhoid fever, puerperal fever, erysipelas, tuberculosis, measles, or other dangerous communicable diseases, other than those specified in rules 1 and 2, may be received for transportation when prepared for shipment by filling cavities with an approved disinfectant, washing the exterior of the body with the same, stopping all orifices with absorbent cotton and enveloping the entire body with a layer of cotton not less than one inch thick, and all wrapped in a sheet and bandaged and encased in an air-tight coffin or casket, provided that this shall apply only to bodies that can reach their destination within forty-eight hours from time of death. In all other cases such bodies shall be prepared for transportation in conformity with rule 2. But when the body has been prepared for shipment by being thoroughly disinfected by an embalmer holding a certificate as in rule 2, issued by the State health authorities, the air-tight sealing may be dispensed with.

RULE 4. The bodies of those dead from diseases that are not contagious, infectious or communicable may be received for transportation when incased in a sound coffin or casket and enclosed in a strong wooden box, provided they reach their destination within thirty hours from time of death. If the body cannot reach its destination within thirty hours from time of death it must be prepared for shipment by filling the cavities with an approved disinfectant, washing the exterior of the body with the same, stopping all orifices with absorbent cotton and enveloping the entire body with a layer of cotton not less than one inch thick, and all wrapped in a bandage and encased in an air-tight coffin or casket. But when the body has been prepared for shipment by being thoroughly disinfected by an embalmer holding a certificate as in rule 2, issued by the State health authorities, the air-tight sealing may be dispensed with.

RULE 5. In case of contagious, infectious or communicable diseases, the body must not be accompanied by persons or articles which have been exposed to the infection of the deceased, unless certified by the health officer as having been properly disinfected, and before selling passage, ticket agents shall carefully examine the transit permit and note the name of the passenger in charge, and of any others proposing to accompany the body, and see that all necessary precautions have been taken to prevent the spread of the disease. The transit permit in such cases shall specifically state who is authorized by the health authorities to accompany the remains. In all cases where bodies are forwarded under rule 2, notice must be sent by telegraph to the health officer at destination, advising the date and train on which the body may be expected. This notice must be sent by or in the name of the officer at the initial point, and to enable the health officer at destination to take all necessary precautions at that point.

RULE 6. Every dead body must be accompanied by a person in charge, who must be provided with a passage ticket and also present a full first-class ticket marked "corpse" for the transportation of the body, and a

transit permit showing the physician's or coroner's certificate, name of deceased, date and hour of death, age, place of death, cause of death, and, if of a contagious, infectious or communicable nature, the point to which the body is to be shipped, and when death is caused by any of the diseases specified in rule No. 2, the name of those authorized by the health authorities to accompany the body. The transit permit must be made in duplicate, and the signatures of the physician or coroner, health officer and undertaker must be made on the original and duplicate copies. The undertaker's certificate and paster of the original shall be detached from the transit permit and pasted on the coffin box. The physician's certificate and transit permit shall be handed to the passenger. The whole duplicate copy shall be sent to the official in charge of the baggage department of the initial line, and by him to the secretary of the state or provincial board of health of the state or province from which said shipment was made.

RULE 7. When the dead bodies are shipped by express the whole original transit shall be placed upon the outside of the box and the duplicate forwarded by the express agent to the express agent and secretary of the state or provincial board of health of the state or province from which said shipment was made.

RULE 8. Every disinterred body dead from any disease or cause shall be treated as infectious or dangerous to the public health, and must not be accepted for transportation unless said removal has been approved by the state or provincial health authorities having jurisdiction where such body is to be disinterred, and the consent of the health authorities of the locality to which the body is consigned has first been obtained; and all such disinterred remains must be enclosed in a hermetically sealed (soldered), zinc, tin or copper lined coffin or box.

Bodies deposited in receiving vaults will be treated and considered the same as buried bodies.*

As the foregoing rules specified that certain privileges should be accorded to "embalmers holding certificates," and implied that certificates were to be regarded as evidences of competency and scientific ability, it was apparent that some organized body should decide as to such competency and issue the certificate contemplated. The railway authorities and undertakers themselves naturally turned to the various State and Provincial Boards of Health, who are the legalized guardians of the public health, as the proper bodies to pass upon the qualifications of embalmers seeking to ship bodies under Rule 2 and under certain conditions named in Rules 3 and 4.

This Board, after carefully considering the matter for six months, at the annual meeting held May 11, 1898, organized an "Embalmers' Department," and adopted the following rules, and thus became the pioneer of all the States or Provinces in the matter of practically carrying out the rules above given:

* So far as their transportation is concerned. In such cases, however, a *disinterment* permit is not required as formerly.

First.—It shall be the duty of every funeral director, undertaker, or embalmer within this State who may desire recognition by transportation companies and common carriers, for the transportation of the bodies of human beings dead from diphtheria, scarlet fever, glanders, anthrax or leprosy, to conform to regulations made therefor by the State Board of Health, to-wit:

Second.—He may make application to the State Board of Health for a permit to prepare such bodies for transportation. Said application shall contain his full name, age and place of residence, and the certification of two legal physicians of good repute in the place where he resides.

He shall pass an examination before the State Board of Health at such time and in such manner as the Board may determine. Said examination shall comprise the following subjects:

- (a) The visceral anatomy and vascular system of the human body.
- (b) The comparative value and action of disinfectants and germicides.
- (c) The proper method, after embalming, for further safely preparing bodies for transportation.
- (d) The meaning of "contagion," and "infection;" the dangers they beget, and the best methods for their restriction and arrest.
- (e) The signs of death, and the best methods of their determination.

And such other topics, general and special, as the Board may from time to time determine.

Seventy-five per cent of satisfactory answers in a scale of one hundred shall be required to entitle the applicant to a permit.

Third.—Upon satisfactory evidence of the competency of the applicant as an embalmer, he may be granted a permit to prepare corpses herein designated for transportation upon the payment of the sum of \$5, to pay the expenses of such examination. Said permit shall be limited to the term of one year, and shall be signed by the President of the State Board of Health, and attested by the Secretary and seal of the Board.

Permits may be renewed upon the payment of \$1 within thirty days after the expiration of the term of a permit.

Fourth.—The failure of the holder of a permit to comply with the regulations of the State Board of Health shall be deemed sufficient cause for the revocation of his permit.

Fifth.—The Secretary of the Board shall keep a record in which shall be registered the name and residence of all persons to whom a permit is granted, and the number and date of the permit, which record shall be for the information of the profession, the public and for transportation companies.

He shall also keep a record of all money received, expenses incurred and paid under these regulations, and make report thereof at each quarterly meeting of the Board.

Sixth.—Bodies of those who have died from diphtheria (membraneous croup), scarlet fever (scarlatina, scarlet rash), glanders, anthrax, or leprosy, may be transported by common carriers upon the affidavit of a funeral director, undertaker or embalmer, made under oath, that he is the holder of a permit from the State Board of Health, giving the number of the permit, his name and residence, and certifying that the body has been prepared for shipment in accordance with the regulations of the State Board of Health, to-wit:

In the case of diphtheria.—The body shall be thoroughly injected with a proven disinfectant embalming fluid, and all orifices of the body, such as the nares, mouth, rectum, and vagina in the female subject, then plugged with absorbent cotton. The body shall then be washed in the disinfecting fluid and wrapped in absorbent cotton layers one inch thick, then bandaged and placed in an air-tight zinc or metallic case.

In case of scarlet fever.—All clothing must be removed from the body and the whole arterial system and cavities, including the cerebro-spinal, injected with a disinfectant of the highest germicidal powers. The body must then be thoroughly washed with the disinfecting fluid; all orifices plugged with absorbent cotton, then covered with absorbent cotton one inch thick, then bandaged and placed in an air-tight zinc or metallic case.

In case of glanders, anthrax or leprosy.—After protecting the hands by either vaseline or gloves, all clothing which has been around the body shall be removed and burned. The body shall then be thoroughly washed with a disinfectant of the highest proven germicidal powers, and sufficient of the disinfectant and embalming fluid injected into the circulatory system to thoroughly saturate all the tissues of the body. All the main cavities of the body shall be filled with the disinfectant, and all orifices plugged with absorbent cotton. The body shall then be washed with the disinfectant, wrapped in absorbent cotton not less than one inch thick, then bandaged and placed in an air-tight zinc or metallic case. When the condition of the body demands the removal of the blood, it may be removed by using a bottle which contains not less than four ounces of the disinfecting fluid. The vein selected for the operation must be opened carefully and the tube introduced to the right auricle of the heart, and the blood aspirated into the bottle without exposing it to the air of the room, or without coming in contact with the hands of the operator.

Seventh.—Disinfectants referred to herein must be approved by the State Board of Health.

Eighth.—The foregoing rules shall go into effect, and be in force on and after September 1, 1898.

In the meantime undertakers all over the State, anticipating the opportunity afforded to prove themselves worthy of certificates authorizing them to prepare and ship bodies hitherto prohibited, availed themselves of every opportunity to attend lectures, witness demonstrations upon cadavers, and in various ways take an advanced position in regard to the science and technique of embalming, so that when the first examination was held, more than fifty presented themselves as applicants for license. Most of them, with their applications, presented diplomas showing graduation from schools of embalming. Since the adoption and promulgation of the rules in May, 1898, there have been four examinations and 240 undertakers have received embalmers' permits, and a stimulus has been imparted to this important and necessary, as well as intelligent and honor-

able class of citizens, that will result in a far greater degree of safety from infectious diseases.

No small degree of credit for this advanced action on the part of the National Baggage Association and the various sanitary organizations, who formulated the rules, as well as of the undertakers who have so promptly and even enthusiastically manifested a desire to put themselves in condition to comply with them, is due to Prof. W. P. Hohenschuh, of Iowa City, who is known all over the country as one of the foremost teachers and embalmers to be found.

It is to be understood that these rules and the provision for licensing embalmers who successfully pass the examination do not in any way interfere with any rights or privileges that undertakers possessed before their adoption.

They simply confer additional privileges and responsibilities respecting those dead of certain specified infectious diseases, whereby those who by examination prove themselves competent may embalm and ship bodies heretofore prohibited.

The knowledge of disinfectants and their practical use in embalming and in the protection of themselves and their families, after exposure to infection, will make the educated embalmers the most logical and efficient agents in the disinfection of premises, clothing, bedding, etc., after recovery or death from an infectious disease. They could do this more efficiently than many physicians and with a great deal more propriety.

The time will come, and is not far distant, when at least one well-equipped undertaker in each considerable town in Iowa will have a disinfection cabinet—approved by the local board of health—where clothing, bedding, curtains, carpets, etc., may be taken and so thoroughly disinfected as to be used without any danger whatever.

TRANSIT PERMITS.

In Iowa the permits used by licensed embalmers are printed on *yellow* paper, and can only be used by them in the shipment of bodies under Rule 2, and under certain conditions named in Rules 3 and 4.

The transit used by unlicensed embalmers and undertakers, and by those licensed in shipment of bodies under Rules 3 and 4, except as provided otherwise in said rules, is printed on *white* paper. Thus station and baggage agents can at once

determine by the color whether the body to be shipped is infectious or not.

Similar forms and colored permits for license holders have been adopted by several other States, and the hope is warranted that a uniformity of transit permit will be adopted and used throughout Canada, the United States and Mexico.

There would then be no delay or embarrassment in the shipment of the remains of any persons dying from any disease except those named in Rule 1.

The following is the form furnished by the Board of Health to every licensed embalmer—the one printed on *yellow* paper. The one printed on *white* paper differs only in the statement in the undertaker's certificate as to his being a licensed embalmer and holding an embalmer's permit:

(Original) TRANSIT PERMIT No.....

.....Railroad.

TRANSPORTATION OF CORPSE.

IOWA STATE BOARD OF HEALTH.

PHYSICIAN'S OR CORONER'S CERTIFICATE.

Name of DeceasedDate of Death.....
(If a minor give parents' name also.)
 Hour of Death.....M. Age.....Years.....Months.....Days.
 Place of Death.....Cause of Death.....
 which is a.....communicable disease, and must be shipped under
 Rule.....

I hereby certify that the above is true to the best of my knowledge and belief.

.....M. D. or Coroner.

Residence.....County of.....State of.....

PERMIT OF LOCAL BOARD OF HEALTH.

This permit must be properly signed, and with Physician's Certificate presented to the Railroad or Express Agent before a body can be shipped.

In the.....of.....County of.....
(City or Township)
 State of.....on the.....day of.....189....
 Permission is hereby given.....holder of Embalmer's
 Permit No.....to remove for burial at.....in the

county of.....State of.....the body of.....
 who died at.....County of.....State of.....
 on the.....day of.....189.....Aged.....Years.....Months
Days, and.....is hereby authorized to accompany
 said remains.

[SEAL.] Signed.....City (or Township) Clerk.

RULE 1. The transportation of bodies dead of smallpox, Asiatic cholera, yellow fever, typhus fever or bubonic plague is absolutely forbidden.

This permit and preceding Certificate must be detached and delivered to the person in charge of the corpse.

This certificate and the Shipping Paster below must be detached at this perforation and securely tacked or pasted on the end of the Coffin Box.

CERTIFICATE OF UNDERTAKER.

I hereby certify that the accompanying dead body of.....
 (If a minor, give the parents' name also.)
 Consigned to.....City of.....in the county of.....
 State of.....and who died of.....has been prepared by me and strictly in
 accordance with Rule.....of the Iowa State Board of Health, for trans-
 portation by railway and in conformity with said rules as printed on the
 back of this permit, and I further certify that I hold an Embalmers' Per-
 mit (No.....) issued by said State Board.

.....Shipping Undertaker.

Residence.....

Subscribed and sworn to before me this.....day of.....189..

This certificate must be sworn to when the body is shipped
 under rule 2.

[SEAL]

PASTER.

Transit permit No...

Station Baggage men must enter hereon a description of the
 ticket, the exact route and VIA WHAT JUNCTIONAL
 POINTS THE TICKET READS, which is held by the
 passenger in charge of the remains.

SPECIAL INSTRUCTIONS—A burial case containing a corpse must not be received for transportation unless the person in charge of the remains presents a certificate of the attending physician or coroner, a permit from the Board of Health and an Undertaker's Certificate that the body has been prepared for burial according to the law of the State. Neither will it be received if any fluids or offensive odors are escaping from the case. Agents will detach the Certificate and this paster at the perforation and tack them securely on the end of the box before shipping.

Date.....

From.....to.....State of.....

No. of Ticket of Escort.....Form No. of ticket of Escort.....

No. of Corpse Ticket.....Form No. of Corpse Ticket.....

Via.....R. R. To.....

Via.....R. R. To.....

Via.....R. R. To.....

Via.....R. R. To.....

Via.....R. R. To.....

Name of Passenger in charge.....Place of residence.....

SignedStation B. M.

[See rules and instructions on the other side.]

(Reverse side):

**RULES OF THE IOWA STATE BOARD OF HEALTH, THE AMERICAN PUBLIC
ASSOCIATION, AND THE AMERICAN ASSOCIATION OF GENERAL
BAGGAGE AGENTS, FOR THE TRANSPORTATION OF
THE DEAD.**

These rules apply equally to all common carriers, and, having been duly adopted and properly published, have the full force of law.

[See rules on pages — and —.]

TRANSPORTATION OF DECEASED PERSONS IN BAGGAGE CARS.

To Railroad Agents, Station and Train Baggage-men:

You will in no case receive a corpse for transportation unless accompanied by a physician's, coroner's or board of health certificate, also an undertaker's certificate that the body has been prepared for burial and shipment in accordance with the rules of the State Board of Health, *nor will you receive it even with such certificate if fluids or offensive odors are escaping from the case.* One full first-class *limited* or *unlimited* ticket will be required for the transportation of a corpse without regard to the age of the deceased, and the word "corpse" must be plainly written on the face of a local and on each coupon of a coupon ticket. A corpse will not be taken for transportation unless a passenger is in charge. A record must be made on the back of your station and trip reports of all bodies shipped and carried, giving name of deceased and destination.

It will be the duty of Agents and Baggage Agents to see that each burial case is properly marked on "Paster," giving date and at what station shipped, point of destination, "State," number and from of ticket, name of passenger in charge and place of residence with name of agent. If the corpse is destined to a point beyond the initial line, the initials of each road over which it passes must be written on the paster; also the terminal point of each road at which transfer is made with the connecting line as shown on the coupons of the ticket.

You will see that the "Certificate of Undertaker" is properly filled out by him and that the paster is properly filled out by yourself and securely fastened on the end of the coffin box before it is put into the car, and the permit remaining you will hand to the passenger in charge of the corpse.

The whole form must be made in *duplicate*, either with a pen, carbon paper, or simplex paper, and the signatures of the physician or coroner and undertaker must be on *both* the original and duplicate copies.

The undertaker's certificate and paster of the *original* will be detached from the physician's certificate and permit and fastened on the end of the coffin box. The physician's certificate and the permit will be handed to the passenger. The *whole duplicate* copy will be sent to the General Baggage Agent of the initial road by first passenger train.

All this information is necessary to insure prompt and correct transportation of the corpse.

(Duplicate) TRANSIT PERMIT No.....

.....Railroad.

TRANSPORTATION OF CORPSE.

IOWA STATE BOARD OF HEALTH.

PHYSICIAN'S OR CORONER'S CERTIFICATE.

Name of DeceasedDate of Death.....
(If a minor give parents' name also.)

Hour of Death.....M. Age.....Years.....Months.....Days.....

Place of Death.....Cause of Death.....

which is a.....communicable disease and must be shipped under Rule....

I hereby certify that the above is true to the best of my knowledge and belief.

.....M. D. or Coroner.

Residence.....County of.....State of.....

PERMIT OF LOCAL BOARD OF HEALTH.

This permit must be properly signed, with Physician's Certificate presented to the Railroad or Express Agent before a body can be shipped.

In the.....of.....County of.....
(City or Township.)

State of.....on the.....day of.....189....

Permission is hereby given.....holder of Embalmer's Permit No....

to remove for burial at.....in the county of.....

State of.....the body of.....

who died at.....County of.....State of.....

on the.....day of.....189....Aged.....Years.....Months.....Days
and.....is hereby authorized to accompany said remains.

(Seal) Signed.....City (or Township) Clerk.

RULE 1. The transportation of bodies dead of smallpox, Asiatic cholera, yellow fever, typhus fever or bubonic plague, is absolutely forbidden.

These Duplicate Certificates must be presented to the Local Board of Health for approval and then sent by the Shipping Agent to the General Baggage Agent of the initial line, and by him to the Secretary of the Iowa State Board of Health.

CERTIFICATE OF UNDERTAKER.

I hereby certify that the accompanying dead body of.....
(If a minor, give the parents' name also.)
Consigned to.....City of.....in the County of.....
State of.....and who died of.....has been prepared by me and
strictly in accordance with Rule....of the Iowa State Board of Health, for
transportation by Railway and in conformity with said Rule as printed on
the back of this permit, and I further certify that I hold an Embalmer's
Permit (No.) issued by said State Board.

.....Shipping Undertaker.

Residence.....

Subscribed and sworn to before me this....day of.....189..

This Certificate must be sworn to when the body is shipped under Rule 2.

[SEAL] PASTER. Transit Permit No.

Station Baggage men must enter hereon a description of the
ticket, the exact route and via what junctional points the ticket
reads, which is held by the passenger in charge of the remains.

SPECIAL INSTRUCTIONS—A burial case containing a corpse must not be received for transportation unless the person in charge of the remains presents a certificate of the attending physician or coroner, a permit from the Board of Health and an Undertaker's Certificate that the body has been prepared for burial according to the laws of the State. Neither will it be received if any fluids or offensive odors are escaping from the case.

Date

From.....to.....State of.....

No. of Ticket of Escort.....Form No. of Ticket of Escort.....

No. of Corpse Ticket.....Form No. of Corpse Ticket.....

Via.....R. R. To.....

Via.....R. R. To.....

Via.....R. R. To.....

Via.....R. R. To.....
 Via.....R. R. To.....
 Name of Passenger in charge.....Place of Residence.....
 Signed.....Station B. M.

BURLAL PERMITS.

Under the Embalmers' Department is also included regulations relating to the burial of the dead. Under the subject of VITAL STATISTICS will be found rules adopted by the Board relative to burial permits. Under the practical application of the rules, as soon as death occurs and the services of the undertaker are invoked, he is expected to apply to the attending physician, or in case no physician was in attendance to someone else knowing the facts, for a certificate setting forth the cause of death as shown by the following form:

Name of Deceased,

 Sex of Deceased,

 Color of Deceased,

 Age of Deceased,

 Yrs. Mos. Days.
 Occupation of Deceased,

 Date of Death,
189....; hour.....M.
 Single, Married, Widow, Widower,

 Nationality of Deceased,

 Place of Birth,

 How Long Resident in this State.

 Place of Death,

 Cause of Death,

Complication,

Duration of Disease,

Place of Burial,

Date of Burial,

Name and Address of Physician Returning Certificate,

These certificates should be furnished to the undertakers by the cities, town or townships in which there is a cemetery, or in which the interment is to take place if in private grounds. Upon receiving this certificate the undertaker applies to the clerk of the city, town or township for the burial permit which he alone is authorized to issue. This permit is in form as follows and should be in book form so that the "stub" can be retained as his voucher and duplicate:

To.....	[S. B. H. Form 17 E.]	} BURIAL PERMIT. This permit must be given to the Sexton or person acting as such, who must return the same as his authority for preparing the grave.
of.....	STATE OF IOWA,	
Died.....189..	.....County	
at.....Street		
Aged.....Yrs.....Mos.....Days		
Sex.....Color.....	Permission is hereby given for the burial at.....	
Cause of Death.....	of the body of.....	
.....	who died at.....(give street and No.) on	
Physician.....	the....day of...189..., aged...years....months...days.	
Physician's Residence... ..	Cause of death.....	
Place of Burial.....	Physician.....	
Undertaker... ..	Undertaker.....	
Dated at..... 189..	Dated at. ....189.. City.....	

No interment can take place in Iowa, legally, without complying with these regulations.

If these regulations were faithfully carried out and reports were made by the clerk, of all such burial permits issued throughout the State, monthly or even annually to the Secretary of the State Board of Health, the question relative to correct data as to deaths would at once be satisfactorily solved.

DISINTERMENT PERMITS.

The Board of Health also regulates the disinterment of bodies.

The code (section 4945) says: "The penalty for digging up, disinterring, removing or carrying away any human body without lawful authority, is imprisonment in the penitentiary not exceeding two years, or a fine not exceeding \$2,500."

No body can be disinterred legally, unless by order of the court, without a permit from the State Board of Health. The Board issues two forms of permit—one for deaths from non-infectious diseases and the other from certain infectious maladies. For either form application is made to the Secretary of the Board. The application blanks are furnished by the Board to all undertakers in the State, and are furnished by them to any person desiring to disinter a body.

The following is the form of application required:

STATE OF IOWA—HEALTH DEPARTMENT.

APPLICATION FOR DISINTERMENT PERMIT.

To the State Board of Health:

Application is hereby made for a permit for the disinterment of the body of.....

(Give full name here, whether it be one, two or three; use no initials.)

now lying in.....Cemetery in the.....

(State whether city, town or township.)

of.....County of.....State of Iowa,

and who died on the.....day of.....18....aged.....years,

.....months.....days, the cause of death being.....

.....and not directly or indirectly by diphtheria, membranous croup, scarlet fever (scarlatina, scarlet rash), smallpox, leprosy, Asiatic cholera, typhus fever, or yellow fever, or other contagious

disease, as shown by the certificate of.....attending

(Give full name of physician here.)

physician.

The body is to be removed by.....

(State whether by railroad or by private conveyance.)

to.....Cemetery in the.....

(State whether city, town or township.)

of.....County of.....

State of.....for interment.

.....Applicant.

This.....day of.....18....

Postoffice address.....County of.....Iowa.

Send permit to.....Postoffice.....

County of.....Iowa.

(See other side.)

Reverse side:

NOTICE.

The penalty for digging up, disinterring, removing or carrying away any human body without lawful authority is imprisonment in the penitentiary not exceeding two years, or a fine not exceeding \$2,500. (Code, section 4945.)

A separate application must be made for each body.

Where cause of death is certified by a coroner, the application must so state.

No permit will be granted for the disinterment of bodies dead from smallpox, Asiatic cholera, yellow fever, leprosy, diphtheria, or scarlet fever (scarlatina, scarlet rash), and for sanitary purposes membranous croup will be deemed to be diphtheria.

No permit will be granted on applicaton made by telegraph or telephone.

Names of persons and places must be written so plainly that no mistakes can be made in the permit.

These applications for permits will be furnished on request to State Board of Health for Form 24 E.

Undertakers and others will save delay and trouble in the removal of corpses by strictly conforming to these instructions.

The following is the form of permit issued in case the death was not from a prohibited infectious disease:

STATE OF IOWA
EMBALMER'S DEPARTMENT
DISINTERMENT PERMIT

APPLICATION HAVING BEEN MADE for the disinterment of the body of
.....now lying buried in.....
Cemetery, in the.....of.....County of
(City, Town or Township.)
.....State of Iowa, who died on the.....day of
.....1.....aged.....years.....months.....days, the cause of
death being.....
and not directly or indirectly by diphtheria (membranous croup), scarlet
fever, smallpox, leprosy, Asiatic cholera, typhus fever, or yellow fever, as
shown by the certificate of death of said deceased, given by.....
attending physician, this is to certify that permission is hereby given for
such disinterment and removal by.....
.....to.....
Cemetery, in the.....of.....
(City, Town or Township.)
County of.....State of.....to take
effect upon approval by the local board of health of the.....

of..... it being understood and provided that nothing herein shall be deemed as contravening or in anywise modifying or releasing the Regulations of the State Board of Health governing the Transportation of Corpses or the requirements for a Transportation Permit, and all Transportation Companies and Common Carriers will be governed accordingly; and provided further, that where the disinterment is for the purpose of reinterment in another part of the same cemetery, or in a contiguous cemetery, the removal shall not be made by any public conveyance.

Given under my hand and seal of the State Board of Health at
Des Moines, this.....day of.....
A. D. 1.....

.....
Secretary.
By.....

The foregoing application for disinterment and removal is hereby approved by the local board of health of the
(City, Town or Township.)
of.....State of Iowa, this.....day of.....1.....

.....
President Local Board of Health.
Attest
Clerk Local Board of Health.

[If a city or town, affix corporate seal.]

In case the death is from a non-infectious disease, the Secretary, upon the receipt of the application, issues the permit; if, however, the application shows the death to have occurred from diphtheria, etc., the application is laid over for consideration by the Board when in session. If the body is to be removed from one lot to another in the same cemetery, or the circumstances are such that it can be done without danger, a *special* permit is granted upon compliance with certain specified conditions. The form of the permit is as follows:

STATE OF IOWA.

HEALTH DEPARTMENT.

SPECIAL DISINTERMENT PERMIT.

APPLICATION HAVING BEEN MADE for the disinterment of the dead body of.....now lying buried in
.....Cemetery, in the.....
of.....County of.....State of Iowa, who
died on the.....day of.....18....aged....years....months....days,

the cause of death being.....
 which is contagious as shown by the certificate of death of said deceased,
 given by.....attending physician; this is
 to certify that permission is hereby given for such disinterment and
 removal by.....
 to.....Cemetery, in the.....
 of.....County of.....
 State of.....upon the following conditions, to-wit:

1. That the disinterment is for the purpose of reinterment in another part of the same cemetery, or in a cemetery nearly contiguous.
2. That the removal shall not be by any public conveyance.
3. That the removal shall be done at an hour when there is the least possible exposure of other persons.
4. That no children shall be present, and only such persons as are actually necessary.
5. That the coffin shall not be opened.
6. That the sexton and all other persons engaged in such removal shall immediately thereafter change their clothing and properly disinfect or burn the same, and shall thoroughly disinfect their hands, head and face.
7. That this Permit shall be approved by the Local Board of Health of the.....of

8.

To take effect upon approval by the Local Board of Health of the.....
of.....; it being understood and
 provided that nothing herein shall be deemed as contravening or in any
 wise modifying or releasing the Regulations of the State Board of Health
 governing the Transportation of Corpses, or the requirements for a Trans-
 portation Permit, and all Transportation Companies and Common Carriers
 will be governed accordingly; and provided further, that where the disin-
 terment is for the purpose of reinterment in another part of the same
 cemetery, or in a contiguous cemetery, the removal shall not be made by
 any public conveyance.

By order of the State Board of Health at Des Moines, the.....
 day of.....189....

.....
 President.

.....
 Secretary.

The foregoing application for disinterment and removal is hereby approved by the Local Board of Health of the..... of.....State of Iowa, this.....day of.....189.....

President Local Board of Health.

(If a City or Town, affix corporate seal.)

Attest.....
Clerk Local Board of Health.

A careful and complete record of all these disinterments is kept by the Secretary. This record shows the date of issue, name of the deceased, date of death, age, cause of death, place of burial, and where removed to.

During the biennial period the records show the following:

Ordinary permits, June 30, 1897, to June 30, 1898, 293; "special" 22; total, 315.

From June 30, 1898, to June 30, 1899, ordinary permits, 345; "special," 22; total, 367.

Whole number of ordinary permits for biennial period..... 638
Whole number of "special" permits for biennial period..... 44

Total 682

The examinations of embalmers are held in January and July of each year, although special examinations were held, since the organization of this department, in order to afford an opportunity to those desiring an earlier examination. Two members of the Board, designated at each meeting, furnish the questions, and rate the papers. The per cent required to pass is 75. All the expenses of this department, printing, postage, stationery, record books, examiner's fees, etc., are paid out of the fees received and hence there is no expense to the State.

VI.

COMMUNICABLE DISEASES.

There is presented herewith a brief description of the cause and prevention of the various diseases that are regarded as communicable or transmissible by direct contact, by infection, or by inoculation. Some of them are common to man and animals. For convenience they have been arranged alphabetically. Some of them are described at greater length in special articles. Quite a good deal of space is given to plague, because but little is known of the disease; and because of the possibility, if not probability, that it may, in this age of rapid transit, appear in various parts of the United States.

The Secretary hereby acknowledges his indebtedness to A. M. Davis, M. R. C. S., England, author of "A Hand-book of Hygiene," in the preparation of this section of this report. The brief and yet comprehensive manner in which he presents the "Causation and Prevention" of the communicable diseases has been followed closely and often copied.

ACTINOMYCOSIS.

CAUSATION.—Actinomycosis is produced by a vegetable organism of a somewhat higher order of life than the bacteria and known as the *actinomyces bovis* or ray-fungus. The colonies as they grow in the tissues can be seen with the naked eye. These bodies are white, yellow, greenish, or almost black. The fungus can be seen by squeezing these little bodies between two glass slides and viewing them with the low power of a microscope. By this means they are seen to be of a radiate structure, with spores or cocci in the center and filaments branching out like spokes of a wheel. The actinomyces can be cultivated artificially on various media at room or incubator temperature. On agar the growth has a dirty, transparent look, and is very tough, it being difficult to remove with the needle enough to make a film preparation. On staining such a

growth it is seen to arrange itself in the form of long filaments which are branched. It stains with any aniline dye.

It is thought that infection of the animal usually occurs through an abrasion of the mucous membrane of the mouth or other part of the digestive tract. It may also occur through the skin or by means of the inhaled air. The fungus occurs in nature principally upon the awns of barley. These awns may penetrate between the teeth and the germs and in this way introduce the fungus into the tissues of the animal. The disease is not contagious. Several animals in each of a number of herds may be infected in the same way from the same source, thus producing the disease in an enzoötic form, though it is usually sporadic. The disease may spread from the seat of the primary lesion to other parts of the body and become general.

Prevention.—For obvious reasons no specific measures of prevention may be recommended. The disease occurs in man but is contracted not from animals, but in the same way as in animals. The parts affected are usually the tongue and jaw bone. Though the disease is not contagious, and there is doubt as to whether it can be reproduced by the use of the flesh of animals affected by it, the meat of such animals, especially if the disease is general, should be condemned for food purposes. It is thought by some that where the disease is purely local the diseased portions might be removed and the balance of the carcass used for food. The thought, however, of using meat from such an animal is revolting!

ANTHRAX (OR SPLENIC FEVER).

CAUSATION.—Disposing.—None known. Largely influenced by occupation, since it is almost entirely limited to butchers, tanners, furriers, wool-packers and sorters, etc.

Direct.—A specific contagion, *bacillus anthracis*. The disease never originates in man, but is introduced by infection from the carcasses, hides or hair of animals that have been affected. The poison enters the body by inoculation, inhalation, and possibly by swallowing. The bacillus is found in the blood, tissues and exudations. Propagation takes place by direct inoculation and by indirect contagion. Direct inoculation occurs in the case of butchers and tanners from handling diseased carcasses or hides. It may occur from eating anthrax-affected meat if not properly cooked, and by the use of infected

butter and milk. Indirect inoculation may take place through the bites of flies. Indirect contagion is the more frequent mode of infection so far as man is concerned.

Prevention.—Persons having a cut or abrasion should be especially careful in handling glandered animals. The flesh of such animals should be condemned for food purposes. Wool sorters, tanners, etc., should avoid exposure as far as possible from the dust incident to their occupations. It would be well to have the articles they handle, while in bales, thoroughly disinfected by steam, and moistened, so that the dangers from dust should be reduced to a minimum.

APTHÆ EPIZOOTICÆ (FOOT AND MOUTH DISEASE).

CAUSATION.—The infectious agent has never been isolated. It is known, however, that it is contained in the natural secretions and excretions and in the discharges from the vesicles and ulcers of the disease. It is also found in the expired air and may be carried in the atmosphere from place to place. The virus is quickly destroyed by drying, boiling and by disinfectants, but will live for several weeks in manure and in damp places. It can be carried from one animal to another in an indefinite number of ways. It is transmitted to man by handling diseased animals. Young animals may contract it by drinking the milk which contains the infective matter. It is readily transmissible from one species to another. It is extremely contagious and spreads with amazing rapidity, causing enormous financial losses.

The disease is transmitted from animals to man by contact, and by using milk or milk products of diseased animals.

Prevention.—Afflicted animals should be isolated; stables disinfected; contact with diseased animals avoided, and milk from such animals should be boiled before using or, better still, be discarded altogether.

BUBONIC PLAGUE.

A great deal of interest is justly aroused in all parts of the world because of the spread of the fearful disease which reappeared in Bombay, India, in January, 1897, and which has spread to some surrounding localities and has recently broken out in Russia and Portugal, thus threatening all Europe, if not America.

The plague usually appears in two forms, the pulmonic, in which the lungs seem principally affected, and a form, which is the more common and less fatal, in which there are buboes or swellings in the armpits and groins. The present outbreak partakes largely of the latter form and is called, from this fact, the bubonic plague.

The earliest record we have, perhaps, of the plague is the outbreak that occurred in the town of Caffa, on the sea coast, north of the Crimea, in 1348. This town was besieged by the Tartars and the disease broke out in their host and thousands died daily as if smitten from heaven. Some of their dead were projected into the besieged city and the disease soon broke out among them. The inhabitants fled from the city in their boats, going to different ports, and thus spread the great epidemic known as the "Black Death."

The first port reached was Constantinople, where vast numbers perished, among them the Emperor's son. Following the outbreak at Constantinople the disease was carried by other vessels to Messina, Genoa, Venice, Florence, to France, England and Ireland, until the whole of Europe was a vast charnel house. It would be interesting to give some of the details; to narrate some of the dreadfully pathetic scenes that followed in the wake of this pestilence that wasted by day and by night.

Some conception of the extent and fatality of the disease may be formed by the following figures furnished by Proust: "In Venice and London, 100,000 deaths; in Vienna, 70,000; in Florence and Avignon, 60,000, in Paris, 50,000. The order of Capuchin Monks lost 126,000 of its members in Germany. The order Minorite Monks lost 300,000 in Italy. In Germany there were 1,200,000. Italy lost half its population. The plague is supposed to have destroyed 25,000,000 out of the 105,000,000 inhabitants of Europe."

The following description of the outbreak of the disease as witnessed during this epidemic by a priest in Avignon, will give a fair idea of the hopelessness and helplessness that prevailed—since the affliction was regarded as a *kismet*—an unavoidable accident or dispensation of heaven. The writer says:

The disease is three-fold in its infection; that is to say, firstly, men suffer in their lungs and breathing, and whoever have these corrupted, or even slightly attacked, cannot by any means escape or live beyond two days. Examinations have been made by many doctors in many cities of

Italy, and also in Avignon, by order of the Pope, in order to discover the origin of the disease. Many dead bodies have thus been opened and dissected, and it is found that all who have died thus suddenly have had their lungs infected, and have spat blood. The contagious nature of the disease is indeed the most terrible of all the terrors of the time, for any one who is infected with it dies, and all who see him in his sickness, or visit him, or do any business with him, or even carry him to the grave, quickly follow him thither, and there is no known means of protection.

There is another form of the sickness, however, at present running its course concurrently with the first; that is, certain apothumes (swellings or buboes) appear under both arms, and by these, also, people quickly die. A third form of the disease, like the two former, running its course at the same time with them, is that from which people of both sexes suffer from apothumes in the groin. This, likewise, is quickly fatal. The sickness has already grown to such proportions that from fear of contagion no doctor will visit a sick man, even if the invalid would gladly give everything he possessed; neither does a father visit his son, nor a mother her daughter, nor a brother his brother, nor a son his father, nor a friend his friend.

The disease has visited India on three occasions, and become widespread. First, in 1612, and lasted for six years; second, in 1685, and lasted for seven years, and third, in Bombay, in 1896, and still continues. The disease was much more persistent in Europe. This black death, described as having devastated Europe in 1328, remained for about 300 years; sometimes smouldering and nearly disappearing and again breaking out in devastating epidemics. In London, for instance, during these three centuries there was an epidemic, on an average, every fifteen years. At the end of this time it suddenly and unaccountably disappeared from the whole of Europe. While sanitation was gradual and more or less imperfect the disappearance of the disease was sudden.

There is a certain district, Gurhwal, in the Himalaya mountains, in which twenty-four outbreaks have occurred since 1823. From its frequent occurrence the people have learned what precautions are required to stamp out the disease with as little loss of life as possible. When the disease appears in one of the villages the people immediately desert the place and live in the jungle—the open country. They remain there for at least a month after the recovery or death of the last case. These refugees are not allowed to enter other villages. They not only desert their village when human beings are attacked, but they do so even if they notice a sickness and mortality among the rats. It is now well known that the plague attacks both men and rats, and a death of rats is a sign that the locality is infected

by the malady. Many interesting confirmations of this fact have occurred during the present outbreak.

Various opinions have been entertained as to the *cause* of the disease. As said previously, the populace very generally, until comparatively recently, have looked upon it as "Kismet,"—fate, and hence could not be avoided; some thought it was by virtue of an effluvium from the tail of a comet; some attributed it to the corruption of the air by the decomposition of filth and as a remedy attempted to prevent its spread by opening doors and windows. The present outbreak has been attributed to some peculiarity in the monsoon immediately preceding; in Canton in 1894, it was supposed to be caused by an unusually dry season. This outbreak of the disease is supposed to have been carried from Hong Kong to the island of Formosa and thence, in September (1896), to Bombay. When the plague broke out in Hong Kong, the Japanese government sent Professor Kitasato to China to study the disease. He examined the glands of those who had died of the disease and found great quantities of bacilli—microbes that he regarded as the cause of the disease. He and others, since, have demonstrated that these microbes are always associated with the plague. They are always present, at least, in certain stages of the disease. They are never found in persons who are free from the affliction, and they have been found in no other disease.

An unfortunate opportunity to prove this theory soon presented itself. Early in 1897 when the plague was raging in Bombay, the Austrian government sent four scientists to Bombay to study the nature of the disease and to devise the most efficient measures to check its progress should it be carried into Austria. They took with them some living plague bacilli, and cultures were made from these. In the study of these bacilli, rats and rabbits were inoculated. An attendant, Barisch, was engaged in cleaning out their cages and in feeding the animals. By some means he became infected. His illness at first was thought to be pneumonia, but owing to his exposure to infection from the plague microbes, the doctors became suspicious and an examination showed the microbes in his sputum. In three days he died with all the symptoms of the plague. In three days Dr. Muller, who had attended him, fell sick with the plague and died the next night. Two nurses were also attacked, one of whom recovered. The patients were all isolated. Efficient disinfection was practiced and the disease got

no further. There were no other cases in the city of Vienna, and no possible source of infection except by the microbes brought from India.

As has been said, plague attacks rats and other small animals as well as human beings. At the beginning of a plague epidemic large numbers of rats leave their holes, go into the houses without the usual fear of man, stagger about the floor and at length die. After this human beings begin to be attacked, and it is well known that it is dangerous to live in a house where rats are dying of the plague. The fact that rats and similar animals are susceptible to the plague has made it possible to carry out such researches as have led to the discovery of a remedy—a protective remedy—the plague vaccine—just as cowpox led to the discovery of a smallpox vaccine.

It would be interesting to give in detail the results of experiments with plague virus as affording immunity against the plague, and yet some examples should be cited.

Professor Haffkine, the noted scientist and bacteriologist, has experimented with this vaccine, and with very satisfactory results. It was well demonstrated that if the smallest portion of plague culture were introduced on the point of a needle into a healthy rabbit or rat it would surely die of plague in three or four days.

Professor Haffkine tried his serum or plague vaccine on some rabbits. He put twenty healthy rabbits into cages. Ten were vaccinated with his plague virus. Then the whole twenty were inoculated with plague culture. The rabbits that had not been previously protected by vaccination all died, and a post mortem examination of their bodies showed the presence, in large quantities, of the plague bacillus. The vaccinated rabbits, though inoculated with the same culture, remained healthy. Repeated experiments of this kind led to the reasonable conclusion that animals, at least, might, by vaccination, be rendered immune against the disease. The next step was to try it on the human subject. Professor Haffkine first bravely vaccinated himself, and later some of his friends. In each case some fever was produced, from which they recovered in a day or two—thus demonstrating that the vaccination was not dangerous.

Plague broke out in the Byculla jail in Bombay, in January, 1897. Men and rats were affected. About one-half the prisoners voluntarily submitted to vaccination by plague vaccine.

Three developed plague the day they were vaccinated, who probably had the disease before the preventive was used. On the same day six of those who refused vaccination took the disease and three died. Of the remaining 148 who were inoculated, only two contracted the disease and both recovered. Of the 173 who were not vaccinated twelve were attacked and six died. In this case all were living under the same conditions. It is reasonable to conclude that of those vaccinated some at least would have died had they not been benefited by the vaccine.

Another jail trial. About a year later plague broke out in the Umarkadi jail, Bombay. All the prisoners presented themselves for vaccination. They sat down in rows in the jail yard and every alternate man was treated. Afterward both classes, those treated and those not, were given the same food, occupation and work. Of those not treated, within the next eleven days there were ten cases of plague and six deaths. Among the others there were only three cases and they all recovered.

Plague broke out in Undhera, in February, 1898. The village contained about 1,000 people—seventy-nine of whom died of plague before inoculations were undertaken. Five hundred and thirty were vaccinated, of whom eight contracted the disease and three died. Four hundred and thirty-seven were not inoculated, of whom twenty-eight were attacked with plague and twenty-six died.

From this beginning, notwithstanding the superstitious prejudices of many of the natives in the villages of India, the benefits of vaccination came to be more and more fully recognized. The results reported to the government by the collector of the Dharwar district were highly encouraging. In this district, during the weeks ending August 26, 1898, the disease was so virulent that among those not inoculated one person in every nine was attacked, while among those vaccinated the ratio was one in 299, and among those who had been vaccinated twice, only one in 755. The whole number who had been vaccinated twice amounted to 26,428.

During the next few weeks the disease seemed to have increased in malignancy, since during the week ending September 16, 1898, about one person in every seven who had not been vaccinated was attacked, of those inoculated twice only one in seven hundred and ninety-three was attacked. At this time 30,911 had been vaccinated. It would be reasonable to

suppose that without vaccination they would have suffered as severely as the others. If, therefore, one in seven had been attacked, as happened in the unvaccinated, more than 4,600 would have had the disease instead of thirty-nine, as was really the case. Among those who had been twice vaccinated only one person in 1,820 was attacked!

For the foregoing the Secretary is greatly indebted to E. H. Hankin, M. A., Agra, India, whose little book on "The Bubonic Plague" has rendered the task of preparing this article easy and pleasant.

The following are the conclusions arrived at by the author as proper preventive measures:

"(1) It is dangerous to allow persons to enter the village who come from a place in which the disease exists. The danger is less if all the inhabitants of the village have been inoculated.

"(2) It is dangerous to go to a place where plague exists, unless one has been inoculated beforehand.

"(3) If plague exists in a village, it is dangerous to live in a house in which rats are dying, it is dangerous to touch a rat dead of plague. It is especially dangerous to live in or near houses where there are many rats. Therefore every one who cannot avoid living in such places should get inoculated, by doing which the danger from all the above causes is greatly diminished.

"(4) If plague is in the neighborhood, the wise man will get vaccinated against plague, and have his family vaccinated against plague as early as possible, even whether or not he is likely to come in contact with infected persons.

"(5) It is dangerous to use clothes or bedding that has been worn or used by a plague patient, unless they have been placed in hot water and boiled. By this treatment the infection carried in clothes can be destroyed.

"(6) It is not right or necessary to run away from a village because plague exists there and to go to another village. If the inhabitants of other villages know the danger they will not admit such fugitives.

"(7) Having left the house because of danger of plague, it is not safe to return until at least a month has elapsed; but this danger is much less for persons who have been inoculated against plague.

“(8) By the efforts of the government many million people were preserved from death by starvation during the last famine. Government is now trying to preserve the people from death by plague. If government had not prevented infected people from traveling by rail, the plague would have been carried to many parts of India that hitherto have remained free of the disease, and many million people would have been exposed to infection who hitherto have been preserved from this danger.”

It will thus be seen that isolation, removal, disinfection, quarantine and inoculation or vaccination are the remedies to be relied on—especially as in smallpox, the last.

CEREBRO-SPINAL MENINGITIS.

There is but little definitely known of this disease except that it is frightful in its symptoms and unusually fatal in its results.

CAUSATION.—Predisposing childhood, young adult age, the male sex and the massing together of those susceptible, such as soldiers in barrack, children in the schools, work houses, etc.

Direct.—The opinion most generally prevalent is that it is produced by a specific contagion—a bacterium, the nature of which, however, is unknown. It is stated that a micro-coccus has been found in the exuded fluid. The means by which the poison enters the body or is discharged by it are unknown. It is believed to be infectious, though not demonstrated. It prevails mostly in winter and in cold and temperate climates. There is a record of sixty-two epidemics in France, in forty-two of which it was confined to the soldiery.

Prevention.—Unfortunately no reliable means of prevention are known. Proper nutrition, avoidance of fatigue, and keeping the feet dry and warm are indicated. Isolation and quarantine are not required and disinfection cannot be recommended, as no one knows what to disinfect.

Period of *incubation* is unknown. A purpuric eruption appears from the second to the fourth day and gives it the name of “spotted fever.” In severe cases this eruption appears within twenty-four hours. Duration of the disease, from one to three weeks. Average mortality about 60 per cent.

CHICKEN POX.

CAUSATION.—A specific contagium. Nature unknown. Contagion resides in scales following vesicles and scabs in the skin. It is not produced by inoculation, but probably enters the body by inhalation.

Predisposing cause.—None known, except that children appear to be mostly susceptible.

Direct.—Personal contact. *Indirect.*—Bedding, clothing, etc.

Incubation.—Very indefinite. Four to sixteen days. Eruption appears within less than twenty-four hours.

Prevention.—No measures recommended, as the disease is so mild and so free from danger that preventive measures are not called for. One attack generally affords immunity against another. Great care must be taken not to regard a mild attack of smallpox or varioloid as chicken pox.

CHOLERA.

CAUSATION.—Predisposing causes are recent arrival in an infected locality; fatigue, especially with want of nourishment; mental and physical depression. Exciting cause, a specific contagium, generally believed to be *Spirillum cholerae Asiaticæ* of Koch, found in the contents of the intestines and in the intestinal wall of patients. It enters the body by inhalation, or by swallowing, in food or water. It is discharged in the stools or vomit. These discharges are said to have no intensity of action when perfectly fresh; their virulence increases up to the third day, and ceases to be infectious after the fourth and fifth days.

The disease is propagated rarely by direct contact, but indirectly through contamination of drinking water, or milk; or clothing, bedding, etc., soiled with the discharges, subsequently dried, and then inhaled or swallowed as dust.

Age, sex or race afford no immunity, except that it is said that negroes are particularly susceptible. It is less dependent upon soil than climatic conditions. It is particularly a disease of warm climates. It is at home in Lower Bengal as an endemic, whence it radiates in all directions in epidemics. The principal conditions of this Bengal region are a very moist, alluvial soil, saturated with organic matter largely polluted with fecal matter, and a tropical temperature. Here cholera is never absent.

There is no longer any question as to the communicability of cholera—that it is carried by human intercourse from place to place; that the poison is imbibed chiefly by contaminated water and articles of food, as well as by the inhalation of air contaminated by the dried discharges as above stated. There is admittedly some condition of the body that allows the poison in one case to reproduce itself, and in another case compels it to be harmless. Attendants upon the sick are more likely to spread the disease in a cholera-infected district than others, and yet healthy persons can only spread the disease if they carry with them infected clothing. The area of infection by the air, apart from human intercourse, is very limited.

Prevention.—As cholera is a filth-engendered disease, and never becomes epidemic where proper sanitary precautions are observed, the real preventive measures consist in preventing water contamination, and the removal of all excremental matter promptly and thoroughly from all towns and dwellings. Under such conditions cholera cannot become epidemic except through great carelessness in the importation of those affected by the disease. To be more specific, all sources of water supply should be carefully guarded, surface and shallow wells should be closed; the water should be boiled and filtered; refuse heaps and accumulations of filth should be removed and burned; cess-pools cleaned and the drains kept in good condition; the diet should be nourishing and yet free from all articles that will produce diarrhoea or disorders of the stomach—such as unripe or over-ripe fruit; intoxicants should be avoided; fatigue and occasions for chill should be guarded against; the abdomen should be protected by a flannel belt; looseness of the bowels should be promptly corrected, and saline purgatives taken with great caution if at all. Very important as preventives against the spread of the disease are isolation of the sick, quarantine of the premises and disinfection of all the discharges. For this purpose the Rome Conference recommended carbolic acid, 5 per cent, or chloride of lime, 4 per cent; Koch prefers carbolic acid, 5 per cent. Where it can be done, the best means of disposal of the dejecta is by burning. The disinfected discharges should not be thrown into streams, but preferably buried. The vomited matter, as well as the excreta, should be disinfected. Soiled clothing should be, where practicable, boiled for a half hour, or soaked in a 2 per cent solution of carbolic acid. Articles that cannot be disinfected should

be burned. No food or drink that has been in the room in which are any sick with cholera should be partaken by any one except the patient. This applies especially to milk. Disinfection of the rooms and furniture by fumigation with formaldehyde; scraping the walls; repapering and repainting; washing the wood-work with disinfectants, and plenty of fresh air are all valuable and essential. The bodies of the dead should be wrapped in a strong disinfectant solution, immediately confined, and buried deeply and quickly.

The *Period of incubation* is from a few hours to a few days—not usually longer than five days. The duration of infectiousness is generally when the stools lose their characteristic rice-water appearance and become more or less solid.

Vaccination.—Experiments by way of testing the preventive value of inoculation have recently been made with encouraging success. In 1885, Dr. Ferran made extensive experiments in Spain, and showed conclusively that such treatment possessed great protective value. Prof. M. Haffkine has been engaged for some time in India in testing the protective properties of this method. Without referring to the technique of the operation, the results in part may be thus stated:

“In March, 1894, cholera broke out in a small native village in Calcutta, India. Of the 200 inhabitants, 116 were at once inoculated. Ten cases subsequently occurred, all amongst the non-inoculated. Of forty-eight persons belonging to four families, twenty-one were not vaccinated, of whom seven took cholera; twenty-seven were vaccinated, of whom none were affected. In a small outbreak at the Gaya goal, in July, inoculation appeared to have a protective effect. An extremely virulent outbreak, amongst British troops, occurred at Lucknow, in August, in which previous inoculation seemed to be of very doubtful benefit, but Dr. W. J. Simpson, from observations at Calcutta, Cawnpore and Dinapore, and keeping in view the Lucknow epidemic, considers that recent experience has afforded strong additional evidence of the protective value of Haffkine's preventive inoculation.”

It would be unwise to conclude from the foregoing limited opportunities to test this method that its value as a protective measure has been fully established. The results, however, are certainly highly encouraging.

DENGUE.

CAUSATION.—This disease, called often “break-bone fever,” is caused by a specific contagium, of which little is known as to its mode of entering and being discharged from the body. It is propagated by direct contagion. A disease of the tropics and hot seasons, mostly confined to the sea coasts and to towns, and is favored by overcrowding. A similar disease affects cattle and other domestic animals.

It resembles influenza, or la grippe, in the suddenness of its attack and rapid diffusion. It is not considered that one attack confers immunity.

Prevention.—No known methods of prevention. Disease, though distressing, is not fatal.

Incubation period unknown. Eruption appears on the third day.

Quarantine not required.

DIPHTHERIA.

CAUSATION.—Predisposing. Impaired condition of the system produced by unhealthy surroundings, especially breathing impure air, which may render the mucous membrane of the throat more susceptible to the disease; a like favorable condition may exist after an attack of scarlet fever, and to some extent after whooping-cough and measles; the puerperal state; and childhood, especially from 8 to 12 years of age. One attack does not assure against a second, but rather predisposes to it.

Direct.—The bacillus diphtheria of Klebs and Löffler, found in diphtheritic membrane, but nowhere else in the body; finding access to the body by inhalation; swallowing milk, and possibly by inoculation. The bacilli are discharged with the diphtheritic membrane and the mucous secretion from the throat and air passages, and produces their baneful effects by means of a toxin or chemical poison resulting from their life processes.

The disease is propagated by direct contagion, by indirect contagion, through infected clothing, bedding, etc.; through milk; by effluvia from drains and manure heaps; by inoculation (in animals), and presumably by evolution of the specific poison from non-specific sore throats. Direct contagion, especially among children at school, is the most common mode of its propagation. Infected clothing and goods may preserve the vitality of the poison for years; milk may be infected from

diphtheritic particles accidentally gaining access and possibly from a specific disease of the cow; sewer-air seems to have been a medium of the spread of the disease, especially when gaining access to sleeping rooms, or through surface street ventilating grates, around which children play; effluvia from manure or refuse in heaps or spread on the ground. Dampness of soil, with rank vegetable decomposition, favors the spread of the disease; and dampness of houses.

It is mostly a disease of cold and temperate climates and is most prevalent in the winter season.

Prevention.—Isolation, quarantine and disinfection are the chief agents to be used as preventives and they should be instituted at once and firmly. Improving the sanitary conditions by removing from the premises dampness, accumulations of decomposing organic matter; the boiling of milk; and the closing of the schools where there are a number of cases. Dr. Thorne of England, says that the massing of children together under certain circumstances has the peculiarity of manufacturing, as it were, an infection of special virulence and vitality. When school is in session and diphtheria occurs or threatens a district the teacher in the primary and intermediate grades should carefully inquire as to whether any of them have "sore throat," and if so they should be excluded from the schools until it is found by medical examination that there are no traces of the disease. Löffler advises washing the throat when diphtheria is prevalent with weak solutions of salt and carbonate of soda, and douching the throat with cold water. The duration of infectivity is not definitely known, hence isolation should be insisted on from thirty-five to forty days, or until no bacilli are found and the convalescence is fully established. The possibility of recurrence of the symptoms and infectiousness must not be forgotten or neglected. Disinfectant washes for the mouth and throat must be resorted to promptly and used persistently, not only for therapeutic, but for preventive reasons. Disinfection of the person, clothing, bedding, furniture and rooms must be carried out in detail. Boiling for suitable articles; formaldehyde; carbolic acid; and solution of corrosive sublimate as applied by physician, undertaker or health officer are suggested. The use of anti-toxin serum has been found by many as reliably preventive as well as curative. Physicians, nurses and attendants, while leaning over the sick, especially when the membrane is plentiful in the throat and air passages, should keep the

mouth closed and plug the nose with absorbent cotton so as not to inhale detached portions of the membrane.

The incubation of the disease is from a few hours to about eight days—seldom more than four days; duration very variable, from a week to several weeks—relapses being frequent. It is infective in the incubative period; during the progress of the disease; and for a long, though, as said, uncertain period after apparent recovery. Infection is retained in non-disinfected clothing, bedding etc., for months.

ERYSIPELAS.

CAUSATION.—*Predisposing.*—The presence of a wound, a low condition of the system from insufficient food, intemperance, over crowding, previous occurrence and constitutional predisposition.

Direct.—A specific contagion—the *micrococcus erysipelatis*; enters the body by inoculation through a breach of surface, or possibly through intact mucous membrane, thrown off in the discharges and emanations, from an erysipelatous wound. Propagated by direct contact—indirectly by contaminated hands, instruments, clothing, etc. The poison is entirely air borne.

The disease is more common in temperate than warm climates, and in damp and cold than in dry and warm weather—especially in spring and autumn. It is liable to break out in hospitals and other public institutions.

Prevention.—Sanitary and hygienic measures, especially free ventilation, and in buildings a correction of undue moisture. Isolation. Disinfection of the discharges from the wounds of such patients. In hospitals, if it breaks out in a ward, the room should be evacuated, the patients removed to tents if the weather is suitable. The State Board of Health does not require quarantine.

Incubation.—Fifteen to sixty days.

HOSPITAL GANGRENE, is an infectious disease that attacks wounds and is due to a specific contagion, doubtless a micro-organism propagated similar to erysipelas, and the same preventive measures are indicated.

PYEMIA AND SEPTICEMIA are also infectious diseases due to inoculation by specific micro-organisms.

Prevention.—For the last three diseases, general hygienic measures, good ventilation and cleanliness and the antiseptic treatment of the wounds.

GLANDERS OR FARCY.

CAUSATION.—*Predisposing.*—No predisposing cause is known further than the fact that it rarely, if ever, occurs except in persons handling horses.

Direct.—A specific poison, believed to be *Bacillus Mallei* contained in the secretions of the nasal mucous membrane of the horse, ass and mule, as well as some other mammals. It enters the body by direct inoculation, through abrasion of the skin or mucous membrane, possibly through unbroken mucous membrane also, and is discharged in the nasal secretion. Propagated, probably, only by inoculation. It is transmissible from horses to man, and from man to man. More prevalent in warm than in cold climates.

Prevention.—Isolation, disinfection, not only of the nasal discharges, but of everything likely to have been contaminated. The sifting out by “Mallein” of the diseased animals from those healthy, and their destruction, and the use of private rather than public watering places, and care by persons treating or handling glandered animals, in keeping the hands clean and disinfected.

Incubation.—Three to eighteen days. The disease is called *glanders* when the nasal and respiratory mucous membranes are earliest and most severely affected; and *farcy* when the lymphatic system, especially, suffers, as when a wound on the trunk or limbs becomes inoculated.

The following interesting communication furnishes a striking illustration of this disease in the human subject:

ALTON, Iowa, October 26, 1897.

Dr. J. F. Kennedy, Des Moines, Iowa:

DEAR DOCTOR—Yours of the 21st ult. to hand. In the following I will give you a brief history of the glanders case reported to the Board last spring.

A. V.; age 3; female; white; American. Always been a healthy child till February, 1897. At this time she had a mild attack of croupous pneumonia, which terminated by crisis on the seventh day. The patient had not yet entirely recovered her strength when, about March 10th, she had an attack of la grippe, and on the 20th of the same month a relapse. Unfortunately no physician was called in either time, so the diagnosis of the parents cannot be verified.

According to the statements of the parents, after the last attack of la grippe the child remained weak; perspired much, and was often feverish.

About April 15th the child complained of itching on the fingers and it was seen that they were red and swollen. This became worse; small blisters now made their appearance upon the affected area, so that the general appearance was similar to an eczema. The redness extended to the back of the hand about half way up to the wrist. Later on there appeared large blebs which, on opening, discharged a puriform fluid tinged with blood. These blebs grew more numerous, were slow in healing; those near each other would merge to form large ulcers.

At this stage the same process was taking place in the patient's mouth, affecting the buccal and labial mucous membranes, the tongue and gums.

There was slight elevation of temperature each evening, with remission in the morning. There was constipation, anorexia, vomiting and probably from straining at stool, prolapse of the rectum.

By about the 20th of April the eczematous condition implicated all the fingers; by the 27th of April the feet and toes were similarly affected, though the lesions were much more severe than those on the hands, the ulcers being much larger and excavated, with ragged and everted edges, involving skin and subcutaneous tissues and exposing tendons and bones.

At this time (the 31st day of May), I saw the case for the first time, and in some respects it looked like a case of blood poisoning. There were numerous boils all over the body, most of which would come to a head and when opened would discharge a sanious, ichorous pus, having a mawkish odor. The big toes were denuded on their dorsal aspect, the tendons and bones being quite exposed, while the little toe of left foot was gangrenous and sloughed off entirely. Boils were forming on different parts of the foot and elsewhere, some open; some opening; and some only beginning to form.

The ulceration about the fingers and hand now also became more destructive, though not so bad as that part of the foot and toes. The skin of the affected area, where it was not destroyed by the ulcerations, was red and swollen and looked something like an eczema of a sluggish type. The boils were liable to appear anywhere, though the extremities, back and head seemed to be the favorite locations.

The inside of the mouth became one large ulcer; in places there was blackening of the tissue as though gangrene had set in. Some of the teeth fell out. The ulceration extended to the nares, naso-pharynx, pharynx, larynx and bronchi. Large abscesses formed in the nose and naso-pharynx, which broke and discharged a horribly fetid pus. The laryngitis became so severe that there was hoarseness for several weeks, and aphonia for one week. For a while there was also capillary bronchitis.

The ulceration seemed to pass down into the stomach and bowels, at any rate the constipation which had existed at first, later on was replaced by a diarrhoea.

Pulse was small, weak and rapid, varying from 120 to 180 per minute. Temperature was not usually very high. The fever was of a hectic type. Patient was much debilitated and emaciated.

During the first three weeks in which I saw the case, there seemed to be indications of improvement. The ulcers began to heal, the mouth and throat improved very much, bronchitis got better, though not entirely well,

diarrhoea much better, and no more vomiting, fever declined and seemed to go away altogether, pulse improved in force and was slower (120).

Four days before death diarrhoea got much worse and at the same time catarrhal pneumonia supervened. Child died on June 24th.

The treatment was various. Before I saw the case it had been put on anti-syphilis remedies, then anti-syphilitic treatment was instituted, though neither treatment did any good. During the time I treated child I gave strychnine, arsenic, iodide of iron, plenty of milk and brandy. For the diarrhoea I gave a powder containing bismuth subnitrate and pepsin.

I cannot tell how the child became infected, for though there were two glandered horses on the adjoining farm, it was not believed that the child could have had direct contact with them. It is more than likely that some one else carried the infection to the child.

Hoping that the above description will serve the purposes of the State Board of Health, I remain,

Very respectfully yours,

FRED. J. SMITH.

GOITRE.

CAUSATION.—*Predisposing.*—The female sex, residence in an infected locality and unsanitary conditions.

The actual cause is unknown. It occurs in circumscribed areas all over the world, especially in mountain valleys. In many places these areas coincide with calcareous soil. The nature of the soil probably imparts some peculiar impurity to the water, but what it is is unknown.

Hirsch believes this disease and cretinism to be due to a specific agent, the nature and mode of propagation unknown, but connected with some definite soil and occurring principally in water. Goitre occurs among horses, dogs, sheep and other domestic animals.

Prevention.—Avoiding localities where it is endemic and drinking rain or distilled water. There have been no observations as to the comparative merits of boiled or filtered water in goitrous places.

GONORRHOEA.

CAUSATION.—A specific contagium, highly infective, the *Micrococcus gonorrhæ*, propagated by direct contagion, possibly developed in prostitutes *de novo*, since some of the organisms normally present in the urethral secretions may, by evolution, under special conditions, take on virulent or pathogenic properties.

Prevention —Such moral influences as will be conducive to the greatest degree of chastity.

Incubation.—Generally four or five days.

INFLUENZA (La Grippe).

CAUSATION.—*Predisposing.*—Nothing definite known. A condition of lowered vitality, old age, defective nutrition and fatigue seem to be predisposing factors.

Direct.—A specific contagium, generally regarded as the bacillus found by Pfeiffer and Canon in 1892 in the blood and bronchial secretion. Propagated by direct contagion. The following is given as an example: A music teacher visited two relatives ill with influenza on April 6th, and returned to his own locality, which had been hitherto unaffected. April 9th he was attacked, but gave lessons at several houses while ill. On April 11th eleven of his pupils, and on April 12th the people with whom he lodged, developed the disease. A similar disease often appears among horses and dogs concurrently. One attack does not confer immunity.

Prevention.—Assuming its contagiousness—isolation is indicated. At any rate, needless exposures to infection should be avoided. When the disease attacks a locality the affected should not mingle in crowds or go to public entertainments. The disease should not be taken into the schools, hospitals, prisons, etc. General sanitary measures are indicated.

Incubation.—Uncertain—twenty-four hours to three or four days. Duration about ten days. Infectivity from beginning to complete convalescence.

No quarantine or placarding required by State Board of Health.

LEPROSY.

CAUSATION.—*Predisposing.*—The predisposing causes are yet in dispute—heredity; improper and insufficient food, especially a fish diet, being advocated and denied.

Direct.—The exciting cause is believed to be a specific contagion. The *bacillus lepræ*, found in the blood and leprous tissue and greatly resembling the *bacillus tuberculosis*. This bacillus, though always present and readily recognized, has not been proven to be pathogenic, as it cannot be transmitted to animals. Mode of entrance to the body unknown, inoculation doubtful, propagation uncertain. Contagiousness denied and affirmed. The discovery of a specific germ renders its infectivity probable. Occurs mostly in tropical climates, but has been found in all latitudes; negroes and natives of tropics most susceptible. Good food, fresh air and sanitary environments are

not favorable to its extension. Its contagiousness is so slight as to require but little in the way of

Prevention.—The bacillus may be too widely diffused and its nature too little understood to be successfully attacked. Proper hygienic measures are highly important; the interdiction of marriage where one or both parties are leprous; the removal of leper children to asylums where they can be properly cared for; the isolation of lepers in colonies or farms; the prevention of lepers acting as barbers, washer men or wash women, or their selling fruit or provisions.

MEASLES.

CAUSATION.—An unknown specific contagium, present in blood, breath, tissues and secretions; finds access to the body by swallowing or inhalation, seldom by inoculation with blood, serum, or nasal mucus; discharged in the desquamating skin, discharged from the eyes, nose, and respiratory membrane.

Propagated generally by direct contagion, indirectly by bedding, clothing, etc. Contagion is borne by the air, and is increased in severity by cold and unfavorable hygienic environments. One attack generally protects against another.

Prevention. — Isolation. Rubbing the surface of the body with olive oil, glycerine or carbolized vaseline. The discharges from the mouth and lungs should be received in vessels or on cloths and should be disinfected or burned. Antiseptic inhalations. Disinfection of person, bedding, clothing, furniture, and the rooms of the dwelling. Unfortunately this is seldom done on the plea that it is not a dangerous disease and children had better have it than adults.

Incubation.—From four to fourteen days—on an average, nine days. Eruption appears usually on the fourth day. Period of infectivity from a month to six weeks and begins generally before the third day—supposedly during incubation. One attack usually prevents another. Placarding but not quarantine required by State Board of Health.

MUMPS.

CAUSATION.—*Predisposing.*—None are known, unless it be youth and the male sex.

DIRECT.—A specific contagium of unknown nature, which enters the body by inhalation and is discharged in the breath. Propagated by direct contagion. One attack usually confers

complete immunity. It is most common in cold and wet weather.

Prevention.—Ordinary measures; isolation and hygienic quarantine not required by State Board of Health.

Incubation.—Variable—from fourteen to twenty-one days. Duration, seven to fourteen days. Infectivity, about three weeks.

PNEUMONIA.

CAUSATION.—Usually endemic, it occasionally becomes epidemic. The *infective* form has a long prodromal stage, late appearance of local signs, frequent limitation to the upper lobe, unusual weakness, very frequent nervous or cerebral complications, as well as gastric symptoms, and a high mortality. It is more common winter and spring, in damp weather, and in temperate climates, and is favored by anything that produces chill. Defective nutrition, insufficient clothing, occupations requiring exposure, deficient ventilation, and the breathing of sewer-air, are all *predisposing* causes. The *infective* form is caused by a specific contagion the *micrococcus pasteuri* or *pneumo-coccus* of Fränkel, which enters the body by inhalation, and is discharged in the sputa. It sometimes occurs by direct contagion.

Prevention.—The avoidance of *chill* is of first importance whatever the form; the wearing of suitable clothing; the avoiding of draughts when heated; taking care to change clothing that has been wet, especially if exposed to draughts or cold; the avoidance of going from an over-crowded and over-heated room to a cold room or to colder air outside.

On the theory that it may be infective in form, disinfection of the sputa is indicated, and handkerchiefs that have been used by the patient should be boiled. Proper ventilation and the exclusion of sewer-air are important.

PUERPERAL FEVER.

Causation —There are several febrile diseases incident to the puerperal condition that are of different origin.

Passing over erysipelalous fever, caused by the absorption of the poison of erysipelas, and other acute infectious diseases, the most common of which is scarlet fever, consideration will only be given to that avoidable form of septicaemia due to inoculation by septic matter from without by the hands of the nurse or doctor, by dirty sponges or instruments, etc.

The *predisposing* causes are said to be prolonged mental distress and an impoverished condition of blood from want of food, and cold and damp weather.

The *direct* cause is the specific contagium producing septicaemia: enters the body by inoculation; is propagated by direct contagion and indirectly through soiled fingers, instruments, sponges, clothing, etc.

Prevention.—Good ventilation, cleanliness, exclusion of all impure and fecally-polluted air. Antiseptic cleansing of the hands of the physician or nurse, also of all sponges, clothes, catheters, bed pans, etc., applied to the parturient woman; daily injections of warm water slightly carbolized if indicated, and all soiled articles and discharges to be immediately removed from the room. A physician having such cases under treatment, should not visit other lying-in-women unless after thorough personal disinfection and change of clothing.

PURULENT OPHTHALMIA.

CAUSATION.—*Predisposing.*—The aggregation of large numbers in barracks, schools, etc., under insanitary conditions, especially deficient ventilation, childhood; and a depressed condition of the system from malnutrition. Simple catarrhal ophthalmia, under such conditions is likely to develop a virulent and highly contagious inflammation, which increases in virulency as it spreads.

The *exciting* cause is some micro-organism. The specific *bacillus gonorrhoea* is one that is highly contagious and dangerous. The disease spreads by contagion—by particles of dried pus floating in the air. In the east, flies frequently spread the disease.

Prevention —The eyes of children in the public schools should be closely watched, and in case of soreness, carefully examined with a view to detecting any specific character. Isolation of the affected as completely as possible; great cleanliness; care in regard to washing, towels, basins, pillow-cases, etc.; very free ventilation, and good and sufficient food.

RABIES.

CAUSATION —*Predisposing.*—None known.

Direct.—A specific contagion, the nature of which is unknown, found in the saliva of the dog, cat, fox, wolf, and occasionally in that of the horse, deer, cattle and other mammals. The poison is also present in the tissues and fluids of the nervous

system, but not in the blood or lymph. It enters the body by inoculation, generally through a bite but also through an abrasion that may be licked by a rabid animal. It is discharged in the saliva which can communicate the disease to animals, including man, but not from man to man. Propagation occurs only by inoculation.

Prevention.—The method of inoculation suggests the remedy. The muzzling or destruction of all dogs running at large where it is known that a rabid animal has found its way into any district is indicated. Dogs and animals that have been bitten should be isolated and penned up until it is definitely determined whether they will have the disease. If affected they should be at once killed and burned or buried deep.

Incubation.—In animals, generally from three to six weeks. It is recommended that an animal suspected to have been bitten by a rabid dog, should be kept under close observation, and only allowed to go out when muzzled, for four months.

The period of incubation in man varies greatly—averages six or seven weeks—though in some cases six or even twelve months. This protracted period of incubation enables the victim to take advantage of the anti-rabic protective inoculation discovered and practiced by Pasteur, the efficacy of which can hardly be doubted.

RELAPSING FEVER.

CAUSATION.—*Predisposing.*—Destitution, with starvation and defective nutrition; fatigue; mental depression; debility from any cause; over-crowding.

Direct.—Believed to be *spirillum obereieri*, found active motile in the blood during a paroxysm, but not during the remissions. Inoculation with blood taken during a paroxysm communicates the disease. Contagion enters the body by inhalation (experimentally by inoculation), and is discharged in the emanations from the skin and lungs.

It is propagated by direct contact and by infected bedding, clothing, etc. A peculiarly offensive odor is given off from the body in which seems to be the infective principle.

Prevention.—As in typhus, free ventilation and cleanliness are most essential and well-nigh, if not wholly, sufficient. Isolation and disinfection of the person and everything in contact therewith should be prompt, continuous, and thorough. Attendants, so far as possible, should avoid inhaling the

emanations from the patient, as the disease is propagated by direct contact, and the rooms should be completely disinfected.

Inoculation.—Uncertain, two to sixteen days. After inoculation, five to eight days. Duration, about eighteen days when there are but two paroxysms. First paroxysm usually lasts from five to seven days—the intermission a week. The relapse occurs about the fourteenth day. There may be three, four or even five of these relapses and intermissions. No quarantine required. Disease has not been considered by Iowa State Board of Health.

ROTHELN, OR GERMAN MEASLES.

CAUSATION.—Some specific contagium unknown—allied to, but distinct from, measles. No initiatory catarrh and no succeeding desquamation. The contagious principle is supposed to be given off in the breath.

Prevention.—No preventive measures required, as cause is unknown and character of the disease so mild.

Incubation.—Five to twenty one days—on an average, fourteen. Eruption appears on first or second. Infectivity from two or three days before the rash appears and lasting from two to three weeks.

Quarantine not required.

SCARLET FEVER.

CAUSATION.—*Predisposing.*—Childhood and shock or injury, such as a surgical operation. One attack almost always affords immunity.

Direct.—A specific contagium; character not certainly known; believed to be Klein's *streptococcus scarlatinæ*; found in the blood and serous exudation from the skin; enters the body by inhalation or by swallowing, especially milk; or by inoculation (puerperal fever).

Discharged in desquamating skin, in secretions from the nose and pharynx, and probably in the breath. Infectious in any period of the disease. Mild cases with but slight sore throat and scarcely any rash may communicate the infection to another in a malignant form.

Propagated by direct contagion; indirectly by infected clothing, bedding, letters, by infected milk, and by inoculation, and may be borne by the air. Greatest prevalence in autumn.

Prevention.—Isolation, arrest of morbid material from the skin, by promoting desquamation; sponging the body twice

daily with tepid water and afterward applying cold cream or carbolized oil. The head should be washed and dressed with carbolized oil: antiseptic inhalations for the throat, and syringing the nose if there be nasal catarrh. Disinfection of person, clothing, bedding, furniture, and dwelling rooms must be thoroughly practiced. The best safe-guard against infection of the milk is to boil it all before using.

Incubation.—Three to eight days usually. It is said that when it is caused by milk the period is two days less. There should be at least ten days for observation after exposure to the disease. Eruption appears on the second day. Desquamation begins on the sixth or seventh day; is seldom completed in less than six weeks. Period of infectivity, about seven weeks.

Quarantine of forty days required by State Board of Health.

SMALLPOX.

CAUSATION.—Predisposing.—No predisposing cause known; though colored races—especially negroes, are especially susceptible.

Direct.—A specific morbid poison of unknown nature. It is found in the pustules and scabs in the skin and mucous membrane; enters the body by inhalation and swallowing, rarely by inoculation, and is discharged in crusts and debris of the pustules.

The disease is spread by direct contagion, and secondarily by infected bedding, clothing, etc. The contagion is air-borne. One attack insures against any others with very rare exceptions.

PREVENTION.—Isolation. Arrest of the contagious matter by smearing the skin with carbolized vaseline, olive oil or glycerine to prevent its diffusion through the air, and by disinfection of the discharges from the mouth, nose and bowels. Rags used for wiping the nose should be burned. Disinfection or destruction of bedding, clothing, furniture, and premises, as well as of the persons of the patients, after convalescence.

The greatest preventive of all, however, is successful vaccination.

INCUBATION.—About twelve days, varying from nine to fourteen days. Rash appears on third day. In cases of exposure and suspected infection there should be isolation for observation at least seventeen days. Quarantine in actual cases should not be less than thirty-five days.

SYPHILIS.

CAUSATION.—A specific contagion, the exact nature of which is unknown, enters the body, by inoculation, through abraded skin or mucous membrane and is discharged in the secretions of the affected person and in the discharges from the sores. Propagated by direct contact, or by inoculation with the blood of a syphilitic patient; by hereditary transmission; and rarely by the use of drinking vessels, privy seats and vaccination.

PREVENTION.—Against the hereditary transmission the only certain protection is that a person suffering from secondary symptoms shall not marry. Against syphilis acquired in the usual way Dr. Demitt says, "The only prophylactic is chastity."

Inoculation period usually twenty-four or twenty-five days.

TETANUS (LOCKJAW).

CAUSATION.—*Predisposing.*—Most commonly a wound, especially if accompanied by laceration or crushing.

Direct.—A specific contagium, the *Bacillus tetani* found in the wound and pus of those afflicted with tetanus. This micro-organism is found in garden soil, street dust, floor sweepings, etc.; enters the body by inoculation through a wound, which seems to be the only method of propagation. Most common in tropical regions, and where there is moisture with a great range of temperature. Negroes and the colored races are most liable to it.

Prevention.—Extreme cleanliness in regard to a wound, and the prevention of access of soil or any kind of dirt to it, and the avoidance of chill, are preventive measures most to be commended.

TRICHINOSIS.

CAUSATION.—Common to swine and man. Caused by a minute worm the *trichina spiralis*. It occurs in hogs in some parts of the United States, but owing to the practice of thorough cooking of pork it is not so frequent in man here as in some European countries. The worm is so small as to require microscopic examination for its detection. It is said that 100,000 may be found in one cubic inch of flesh. The embryonal form of the worm migrates to the various muscles of the pig and there lies coiled up between the muscle fibres surrounded by a small sac. This in time becomes infiltrated with calcareous material. If a portion of this flesh in a raw state is ingested by

man, the cyst wall is destroyed by the gastric juice, the parasite then reaches maturity rapidly, lays eggs which hatch in a few days, and a new generation is produced. These young worms pass through the intestinal wall and lodge in the various muscles and tissues throughout the body, giving rise to a disease known as trichinosis. This disease is manifested by peculiar painful symptoms, is very grave and likely to prove fatal. If the patient can withstand the migration of the trichinæ, he may recover. The preventive is, of course, careful inspection of all swine slaughtered, in order to preclude possibility of trichinous pork being put upon the market. This inspection is already carried out on a large scale by the United States government, but it should be extended to all cities and towns. As a secondary precaution, no pork should be eaten unless it has been thoroughly cooked throughout, so as to kill any parasites which may exist in it.

Trichina in embryo encapsuled.

Prevention.—As stated above; careful inspection and thorough cooking of the meat.

Incubation.—Variable; generally within a few days.

TUBERCULOSIS.

CAUSATION.—*Predisposing.*—Hereditary predisposition; any debilitating cause, especially the want of fatty foods; syphilis; continued breathing of impure air; the inhalation of irritating particles; exposure to damp and chill; previous attack of acute disease, especially bronchitis or pneumonia.

Direct.—A specific contagium—the *Bacillus tuberculosis* (Koch) found in the sputum of persons affected with pulmonary tuberculosis, and in visceral lesions.

Enters the body by inhalation of air containing particles of dried tuberculous sputa to which the bacillus is adherent, or by the use of food in which it is contained; the milk of tuberculous cows, and the flesh of tuberculous animals when used as food without proper cooking. Discharged from the body in the sputa. Propagated by direct contagion in very rare instances, and very rarely by inoculation. Generally, indirectly, by inhaling the sputa when dried and floating in the air with dust particles; through the milk and meat of tuberculous animals. Pretty generally admitted that the bacillus is power-

less against a healthy constitution and a healthy mucous membrane. It occurs in all climates—more frequently in low and damp soils than in high and dry altitudes. Children are most frequently infected by milk, and hence have most commonly the intestinal form.

Prevention.—Outdoor life: free ventilation; avoidance of overcrowding; proper nutrition; suitable clothing, so as to avoid “colds,” especially in those who have had bronchitis or pneumonia; occupations that best afford pure air, especially air free from the irritating particles of dust incident to some trades; the inspection of dairy herds regularly so as to detect the presence of tuberculosis, and the boiling of all milk from suspected herds; inspection of meats, so as to detect tuberculosis, and the thorough cooking of the same; the thorough disinfection of all the sputa from tuberculous subjects—a most important measure; no spitting on the floors or roadsides, but in rags or paper, to be burned immediately; disinfection of the rooms inhabited, as well as bedding, furniture, etc., the disinfection of railway coaches and sleepers; care in sweeping to keep down the dust; and the care of the consumptive poor where proper preventive measures cannot be carried out in proper sanatoria, thereby affording in many instances opportunities for successful treatment, as well as preventing other members of the family from contracting the disease.

TYPHOID FEVER.

CAUSATION.—*Predisposing.*—Youth and a recent arrival in a district where the disease is prevalent. Individual or family susceptibility varies greatly. Mental depression, over-work and debility are contributing factors. One attack usually confers immunity, but not invariably.

Direct.—A specific contagion, generally, but not universally acknowledged to be the specific *bacillus typhi abdominalis*. The mode of entrance into the body is by swallowing contaminated water or food (especially milk), or by inhalation of air containing the microbe. The bacillus is found in the spleen, liver, mesenteric glands, and occasionally in the blood, as well as in the stools.

The poison is discharged from the body in the stools, which, however, do not seem to have any infective property when freshly passed, but develop the property within about twelve hours.

Propagation is effected by indirect contagion through food or drink, or by infected bedding or clothing, or by air contaminated with the poison.

Prevention.—Pure air, pure water, pure milk; dwelling kept free from sewer-air. If there is any suspicion of contamination of water or milk, boiling should be resorted to. Stools from the sick with typhoid should be disinfected and buried; all clothing and bedding should be disinfected by boiling if practical. Quarantine not required by the State Board of Health.

Incubation.—About two weeks; may be only five or six days. Eruption on seventh to twelfth day. Duration, three to four weeks. Infectivity during the whole course of the disease. Infected clothing, etc., may be contagious for at least two months.

TYPHUS.

CAUSATION.—*Predisposing.*—Destitution, bodily fatigue, mental depression, debility from previous illness, intemperance—anything that lowers the vital powers, over-crowding, with improper ventilation, and want of cleanliness of persons and surroundings. Most common in persons from 15 to 25 years of age. One attack is generally protective against subsequent ones.

Direct cause.—A specific poison, nature unknown. Enters the body only by inhalation; discharged in emanations from skin and lungs. Propagated by direct contagion and indirectly by bedding, clothing, etc. Direct contagion takes place only at a very short distance—but slight during the first week, most when the odor from breath and body is strongest, and ceases when the fever passes off. The disease may be carried by persons, not themselves having the disease, in case of exposure.

Prevention.—Free ventilation and cleanliness are essential and sufficient. Though destitution may not be prevented, free ventilation in wholesome dwellings and the means of maintaining personal cleanliness may be provided for all. To prevent its spread, quarantine, isolation and disinfection are essential and should be observed faithfully. Nurses and attendants should expose themselves to the odors from the body of the patient as little as possible. Everything in any way in contact with the patient should be most carefully and thoroughly disinfected. The rooms should be fumigated, the walls scraped, the paper removed and the walls repapered and an abundance of fresh air admitted.

Incubation.—From a few hours to two or three weeks—ordinarily from five or six to ten or twelve days. Eruption generally fourth or fifth days. Duration about fourteen days—never more than twenty-one.

State Board has taken no action in regard to this disease.

WHOOPING COUGH.

CAUSATION.—*Predisposing.*—Childhood, up to 8 years; teething; the condition of the mucous membrane left after measles; and some other diseases. One attack confers almost certain immunity.

Direct.—A specific contagion of unknown nature; enters the body by inhalation, and is discharged in the mucous secretion from the air passages. Propagated by direct contact and indirectly by infected clothing, bedding, etc. Persons affected very slightly, or even those who themselves are insusceptible may communicate the disease to others.

Prevention.—Isolation; disinfection of the discharges from the air passages; disinfecting the room and plenty of fresh air, as well as disinfection of all the bedding, clothing, etc. Should be placarded and children from the family kept from the public schools. State Board of Health does not require quarantine.

Incubation.—Four to fourteen days, usually four to ten. Infectivity for six to eight weeks from the onset of the disease. Cough and spasms may return but does not bring the contagious property with them.

YELLOW FEVER.

CAUSATION.—*Predisposing.*—The chief predisposing cause is the recent arrival in an infected locality—especially of one from a cold or temperate climate. One attack generally confers immunity.

Direct.—A specific contagion; identity somewhat in dispute; enters the body, perhaps, by inhalation; discharged possibly by exhalation from lungs and skin, in the black vomit or in the fecal evacuations. Propagation rarely occurs by the sick to the well; almost always indirectly through infected substances, and dwellings, conveyances, etc. It is essentially a tropical malady. Chinese and pure-blooded negroes are largely, if not entirely, insusceptible; this is probably due to the fact that long residence has rendered them immune. Temperature is the most impor-

tant factor in influencing its prevalence. On the other hand, an epidemic is always terminated by cold sufficient to freeze the ground. The principal *foci* of the disease on sea coast towns, or on the banks of navigable rivers, especially in the lowest and filthiest quarters. It also occurs on shipboard and the disease is thus spread.

Its nature is entirely unknown. It is not malarial, since it is communicable.

Prevention.—Good sewerage arrangements, so that the excreta may be rapidly and completely removed from the dwelling, free ventilation, avoidance of over-crowding, cleanliness of person, clothing and habitation, and pure water.

Where the disease has occurred there should be isolation, disinfection of the black vomit and stools by strong chemical disinfectants; disinfection of all bedding, etc.; very free ventilation of the sick room. The paper must be removed from the walls, the walls scraped and whitewashed, or papered. Quarantine and isolation are essential. Suspects should be quarantined for at least ten days.

Incubation.—Generally six to ten days. Duration of disease two or three weeks. Infectively during the entire run of the disease, and until the person and all belongings, and the premises have been thoroughly disinfected.

VII.

BARBERS AND HAIR-DRESSERS.

The following circular is issued by the Pennsylvania State Board of Health and contains hygienic hints for barbers and hair-dressers that are equally applicable to Iowa. The dangers that are pointed out and the remedies suggested are worthy of careful consideration.

Inasmuch as there is no doubt that certain diseases of the skin and scalp, as well as some of the more common contagious diseases, are often propagated by the instruments and hands of barbers and hair-dressers, the State Board of Health of Pennsylvania has prepared this circular, and suggests that the hints here given be carefully studied by barbers and hair-dressers, with the view of preventing disease from spreading through any neglect on their part.

First.—No person suffering from any disease of the skin, scalp or hair should act as a barber, nor should any one suffering from consumption or any disease commonly known as contagious serve in this capacity. When diphtheria, scarlet fever, smallpox, measles or other contagious diseases occur in the family of a barber, he should not nurse the patients, nor in any way come in contact with them, but should leave their care to members of the family who do not enter his shop or place of business; and temporarily change his residence.

Second.—The place of business (the shop or parlor) should be kept scrupulously clean, as should also all the chairs, razors, clippers brushes, towels, and all other articles or instruments used in the business. Towels should be carefully washed and then rinsed to remove the odor of soap.

Third.—Persons suffering from any disease of the skin, scalp or hair, or from consumption, or convalescent from smallpox, scarlet fever, diphtheria or other contagious disease should not visit any barber shop or parlor, but should be attended by the barber or hair-dresser at their own homes. All instruments used on sick patients should be carefully disinfected after such use.

Fourth.—Customers should be encouraged to own their own instruments (razors, soaps, brushes, etc.), and in the case of those suffering from diseases of the skin, scalp or hair, this should be compulsory. For operations on a dead body, the barber should have instruments used only for this purpose.

DISINFECTION OF INSTRUMENTS.

Fifth.—Razors and clippers may be disinfected by boiling for five or ten minutes in soapy water or in water containing a little carbonate of potassium. For this purpose they should be laid in an enameled or galvanized dish, completely covered by the water. After boiling, they should be carefully dried.

Steel instruments boiled in this solution are not liable to rust.

Hair brushes, combs and strops may be disinfected by placing them in a small closet or case which closes hermetically (is air-tight), in which is kept a saucer constantly filled with a solution of formalin. It is recommended that all instruments be laid on racks or trays in this closet after using. If this is done, every customer can have a thoroughly disinfected instrument for use in his case. Brushes and combs will need cleaning with bran or clay in hot water at intervals.

Shaving brushes may be disinfected by being placed in boiling water for five minutes before using, or, better still, the brush may be entirely dispensed with and a puff of cotton used, which can be destroyed after one using.

Before passing from one customer to another, the barber or hair-dresser should wash his hands thoroughly. He should use warm water, and carbolic soap, or one containing mercuric chloride.

The powder puff so constantly used should be replaced by a ball of wadding, or better by a powder blower. The ball of cotton should be thrown away after one using.

The lump of alum used to stop the flow of blood, should be broken into small pieces, and after using one of these on a customer it should be thrown away and not used a second time. Some prefer the burnt or calcined alum, applied on cotton, which can be thrown away after one using.

Only strictly clean linen, towels, wrappers, etc., should be used for each customer. If a freshly laundered wrapper cannot be supplied to each customer, a clean towel should be used in place of the wrapper.

Vaseline and wax should be used carefully, so as not to pass disease from person to person. The hair-dresser should remove vaseline from the vessel containing it with a spatula or spoon, and not by inserting his possibly contaminated fingers into the vessel. Each person should have his own wax.

The barber should not employ sponges in his work, nor should they ever be seen in shaving or hair-dressing establishments. This is because they cannot be cleansed as a towel or wash rag may be. In their place a towel should be employed.

Sixth.—In order to cleanse the floor of the establishment, it should be sprinkled with dampened saw-dust or wet tea leaves, and then carefully swept, in order that as little dust as possible may be raised. The sweepings should be burnt every evening.

Seventh.—The shop or parlor should be thoroughly ventilated before the day's work is begun, and some arrangement for continuous ventilation should exist throughout the day.

VIII.

RAILROAD ACCIDENTS.

For several years special efforts have been made by railway managers for the reduction of the number of accidents, resulting in death and injury. These efforts have not alone been prompted by the interests and demands of humanity. There are large economic considerations as well.

In order to render these casualties less frequent, various measures have been proposed. The adoption of air-brakes and automatic couplers has promised so much that legislatures in many of the states have required that within certain specified times the railroads in their respective states should be furnished with these safety appliances. In 1892 Iowa swung into line and passed a statute requiring such equipment on the railroads operated in Iowa. The change was not only a very expensive one but difficult, because of the different height and construction of cars—freight and passenger.

The legislature very properly extended the time—the second extension expiring January 1, 1900.

The twenty-first annual report of the Board of Railroad Commissioners, for the year ending June 30, 1898, has this to say in regard to compliance with the law in this respect:

The old link and pin coupler, to which has been charged many of the accidents and ills which railroad flesh is heir to, is rapidly disappearing, and in its place there is being put in the most approved automatic couplers that invention and mechanical skill have as yet devised, thus obviating to a great extent the necessity of going between cars to couple and uncouple the same. It is believed that the expiration of the time limit fixed by the last general assembly will see the provisions of that law referring to automatic couplers and air brakes in effect, and these life saving safety appliances in general use.

As a matter of interest, and to show, if possible, to what extent life and limb have been protected by this innovation, the following figures, showing number of persons killed and injured by Iowa railroads for the years ending June 30, 1894, 1895,

1896, 1897, and 1898, as reported by the Board of Railroad Commissioners, are given:

1894.			
KILLED—		INJURED—	
Passengers	7	Passengers	62
Employees	48	Employees	367
Others	90	Others	62
Total	145	Total	491
CAUSE OF DEATH—		CAUSE OF INJURY—	
Derailment	5	Derailment	46
Collisions	8	Collisions	15
Caught in frogs		Caught in frogs	19
Coupling cars	7	Coupling cars	91
Falling from train	17	Falling from train	32
Getting on and off train	15	Getting on and off train	33
Highway crossings	16	Highway crossings	27
Miscellaneous	25	Miscellaneous	204
Overhead obstruction	2	Overhead obstruction	6
Stealing ride	5	Stealing ride	6
Intoxicated	4	Intoxicated	4
Trespassers on track	41	Trespassers on track	8
1895.			
KILLED—		INJURED—	
Passengers	4	Passengers	39
Employees	47	Employees	330
Others	82	Others	74
Total	133	Total	443
CAUSE OF DEATH—		CAUSE OF INJURY—	
Derailment	9	Derailment	29
Collisions	3	Collisions	9
.....		Caught in frogs	4
Coupling cars	5	Coupling cars	80
Falling from train	20	Falling from train	37
Getting on and off train	10	Getting on and off train	32
Highway crossings	13	Highway crossings	19
Miscellaneous	34	Miscellaneous	21
Overhead obstruction	2	.....
Stealing ride	8	Stealing ride	12
Intoxicated	2	Intoxicated	1
Trespassers on track	27	Trespassers on track	10
1896.			
KILLED—		INJURED—	
Passengers	6	Passengers	62
Employees	36	Employees	411
Others	94	Others	84
Total	136	Total	557

CAUSE OF DEATH—		CAUSE OF INJURY—	
Derailment	5	Derailment	41
Collisions ..	2	Collisions	19
Caught in frogs		Caught in frogs.....	5
Coupling cars.....	6	Coupling cars.....	97
Falling from train.....	19	Falling from train	35
Getting on and off train.....	4	Getting on and off train	37
Highway crossings.....	12	Highway crossings.....	26
Miscellaneous.....	27	Miscellaneous	252
Overhead obstruction.....	3	Overhead obstruction.....	2
Stealing ride.....	15	Stealing ride	18
Intoxicated	2	Intoxicated	2
Trespassers on track.....	41	Trespassers on track.....	23

1897.

KILLED—		INJURED—	
Passengers	27	Passengers.....	81
Employees.....	40	Employees	291
Others	90	Others	86
Total		Total	
157		458	

CAUSE OF DEATH—		CAUSE OF INJURY—	
Derailment	1	Derailment	26
Collisions	30	Collisions	61
Caught in frog.....		Caught in frog.....	1
Coupling cars.....	7	Coupling cars.....	80
Falling from train	14	Falling from train	65
Getting on and off train.....	7	Getting on and off train.....	35
Highway crossings.....	13	Highway crossings.....	20
Miscellaneous	16	Miscellaneous.....	126
Overhead obstruction.....		Overhead obstruction.....	3
Stealing ride.....	17	Stealing ride.....	12
Intoxicated.....	2	Intoxicated.....	1
Trespassers on track.....	50	Trespassers on track.....	28

1898.

KILLED—		INJURED—	
Passengers	5	Passengers	30
Employees	44	Employees	301
Others	114	Others.....	70
Total		Total	
163		401	

CAUSE OF DEATH—		CAUSE OF INJURY—	
Derailment	1	Derailment	16
Collisions	10	Collisions	26
Caught in frog.....		Caught in frog	1
Coupling cars.....	4	Coupling cars.....	75
Falling from train	18	Falling from train	50
Getting on and off train.....	15	Getting on and off train.....	34
Highway crossings.....	15	Highway crossings.....	13
Miscellaneous.....	28	Miscellaneous.....	144

CAUSE OF DEATH—

Overhead obstruction.....	1
Stealing ride.....	22
Intoxicated	3
Trespassers on track.....	45

CAUSE OF INJURY—

Overhead obstruction....	2
Stealing ride.....	17
Intoxicated	4
Trespassers on track.....	19

It was hoped that the application and use of the automatic couplers and air-brakes would show a decided reduction in the number of casualties, somewhat in proportion to the number of cars so equipped, but such can hardly be said to be the case.

So far as the couplers and brakes are concerned, the casualties in the above tables of "killed" and "injured" are shown in the columns headed "Coupling Cars" and "Falling from Trains."

The tables show the following for the years indicated:

1894	{	Killed.....	145	{	Coupling cars.....	7
					Falling from train	17
	{	Injured ...	491		Coupling cars.....	91
					Falling from train.....	32

Total accidents, 636; coupling cars, 98; falling from train, 49.

1895	{	Killed.....	133	{	Coupling cars.....	5
					Falling from train	20
	{	Injured ...	443		Coupling cars.....	80
					Falling from train	37

Total accidents, 576; coupling cars, 85; falling from train, 57.

1896	{	Killed.....	136	{	Coupling cars.....	6
					Falling from train	19
	{	Injured ...	557		Coupling cars.....	97
					Falling from train	35

Total accidents, 693; coupling cars, 103; falling from train, 54.

1897	{	Killed.....	157	{	Coupling cars.....	7
					Falling from train	14
	{	Injured ...	458		Coupling cars.....	80
					Falling from train	65

Total accidents, 625; coupling cars, 87; falling from train, 79.

1898	{	Killed.....	167	{	Coupling cars.....	4
					Falling from train	18
	{	Injured ...	401		Coupling cars.....	75
					Falling from train	50

Total accidents, 564; coupling cars, 79; falling from train, 68.

In 1894, coupling cars and falling from train, 147 accidents; in 1895, 142; in 1896, 157; in 1897, 166; and in 1898, 147—showing exactly the same number of accidents, from the two specific causes, in the year 1898, with the equipment contemplated by law so nearly completed, as in 1894, when they first began to be used.

The increase in the number of men employed as brakemen and switchmen can hardly account for these rather disappointing figures.

The accidents from coupling cars alone are: In 1894, 98; in 1895, 85; in 1896, 103; in 1897, 87; and in 1898, 79—a rather hopeful showing.

It is a satisfaction to believe that the men who are operating railways in Iowa are alive to these facts and are doing all they can to lessen casualties, upon their respective roads, from every cause.

The question of *car sanitation* is one that is being intelligently discussed by the ablest railway surgeons of the country and such practical methods of disinfection and ventilation are being considered and advocated as will secure the greatest safety and comfort for their employes and passengers.

It may not be amiss under this head to heartily commend the action taken by these great corporations in the way of prohibiting their employes the use of intoxicating drinks, and in requiring them to be vaccinated. No persons are so likely to be exposed to smallpox as the trainmen, including porters and news agents, and it is a wise provision adopted by some, if not by all our railroad companies that all such trainmen shall furnish satisfactory evidence of successful vaccination.

Smallpox is by no means, however, the greatest menace to the traveling public, in the way of infection. The dangers of contracting tuberculosis are far greater and the consequences immeasurably more serious. It is a pleasure to note that some of the railroads are forbidding spitting on the floor of the coaches. Tuberculosis is largely propagated by the inhalation of the dried sputum of consumptives.

It would be well for all our railway companies not only to forbid spitting on the floor of coaches and sleepers, but to have on each train a sufficient number of small cuspidors to supply each passenger who expectorates—whether after coughing or not, with such a convenience for disposing of his sputum. These could be taken up by the porters or trainmen and finally disposed of by burning or disinfection.

IX.

VITAL STATISTICS.

Few persons have an adequate conception of the great importance and value of reliable vital statistics—a complete or at least approximately complete record of marriages, births and deaths.

The statute relating to the State Board of Health, since its enactment in 1880, has contemplated such a record, and the Board has used all its power of persuasion and invoked the law, and yet the data respecting births and deaths have been so meagre and evidently so incomplete and unreliable that the Secretary has never felt that he was justified in publishing such a registration. Inasmuch as no one can be married without a certificate from the clerk of the district court, and as each marriage has to be returned to, and be recorded by, this officer, and by him reported to the State Board of Health, it may be said that this part of the record is practically perfect.

There can, therefore, be shown, in the office of this Board, data respecting every marriage that has taken place in the State since 1880—the names of the contracting parties, and their nationality; the names of their parents; the ages of husband and wife; the place where the marriage was celebrated; the officiating minister or magistrate, etc. In case the records in the court house, at the county seat, were burned, as has occurred, there is, in the office of the State Board of Health, securely bound, as arranged alphabetically by counties, official copies of these marriages. The value of such a record can only be appreciated by those settling estates, or in divorce proceedings where the county records have been destroyed or lost.

It is to be regretted that the data respecting births and deaths are not as perfect. The fact is, they are very unreliable so far as numbers are concerned. The records, so far as

they are returned, are very satisfactory, unless it be that the cause of death is often not clearly or correctly given.

The Board has taken a step in the way of requiring "burial permits," for every person interred, in the State, whether in city, town or country.

The rules of the Board respecting burials are as follows:

RULE 28.—Upon the death of any person within the limits of a city, town or township, it shall be the duty of the physician who was attending at the time of death, or of the coroner, when the case comes under his official jurisdiction, to furnish, within twenty-four hours after such death, to the undertaker, or other person superintending the burial of said decedent, a certificate setting forth the full name, age, sex, color, place of death, date, and cause of death, and such other facts as may be required by regulations of the State Board of Health and the statutes of Iowa. If any person shall die without a physician in attendance, it shall be the duty of the undertaker, or of any person acquainted with the facts, to report the same to the health officer of the local board of health, who is hereby authorized to give a certificate of death as aforesaid, *provided*, it be not a case requiring the attendance of a coroner.

RULE 29.—No sexton or other person or persons, having charge or control of any cemetery, burying place, or tomb, or vault, and no undertaker, or other person or persons, shall inter, entomb, or place in any vault, the dead body of any person, or remove such body from or out of any city, town or township without having procured a certificate of death as provided in rule 28; and it shall be the duty of any undertaker, or other person or persons having charge of the burial or removal of the dead body of any person to deliver said certificate of death forthwith to the clerk of the local board of health.

RULE 30.—It shall be the duty of the clerk of a local board of health upon the presentation of a certificate of death, to issue a permit to inter, entomb or place in a vault the body of the deceased person named in such certificate. *Provided* a body dead from smallpox, Asiatic cholera, leprosy, yellow fever, typhus fever or bubonic plague, shall not be deposited in a receiving vault.

If these rules were carried out and a report of all such interments were made annually to the Secretary of the State Board of Health upon forms that would be furnished by the State Board there would then be, with the marriage record, reliable and valuable as well as interesting data respecting marriages and deaths, leaving only births to be provided for. The legislature should come to the assistance of the State Board by enacting severe penalties for interring a human body anywhere under any conditions within the State except upon a burial permit issued by the clerk of the city, town, or township; it should require that records of such interments should be kept by such clerks, and copies thereof sent

to the office of the State Board of Health on or before June 1st of each year, showing the number of interments within their respective cities, towns, or townships for the calendar year ending December 31st, immediately preceding. If this were done the assessors could be relieved of collecting these data, and the clerks of the district courts would not be required to furnish as now such incomplete returns.

The Legislature should require physicians and coroners, upon application of the undertaker or sexton of any cemetery, to furnish a report showing cause of death and such other data as might be required by the State Board of Health.

As to births, the statute should require, under a severe penalty, every physician or midwife to report to the county clerk on or before the tenth day of each month every birth occurring within his or her practice during the month preceding, and in case there had been no physician or midwife in attendance the report should be made by the father or mother. A reasonable compensation should be allowed for every birth so reported. Copies of these reports should be made to the Secretary of the State Board of Health, by the clerks of the district courts, for the year ending December 31st immediately preceding.

With the requirements above suggested enacted and enforced statistics might be secured and a registration ensured that would be practically complete and of great value.

It may be interesting to know what the records, as we have them, show as compared with the State census of 1895, which gives the number of births and deaths for each county for the year 1894. By some singular oversight there is no record, in this census report, of the number of marriages for 1894; and it has been supplied from the records of the State Board of Health.

The records for 1896 and 1897, as given in the following table, are compiled from the reports of the clerks of the various the Secretary of the State Board of Health. The records we counties to have, including births and deaths as given in State census of 1895, show the following as to marriages, births and deaths in the State for the years 1894, 1896, and 1897:

VITAL STATISTICS.

COUNTIES.	1894.			1895.			1896.			1897.		
	STATE CENSUS, 1893.			BOARD OF HEALTH RECORD.			BOARD OF HEALTH RECORD.			BOARD OF HEALTH RECORD.		
	MAR- RIAGES.	BIRTHS.	DEATHS.	MAR- RIAGES.	BIRTHS.	DEATHS.	MAR- RIAGES.	BIRTHS.	DEATHS.	MAR- RIAGES.	BIRTHS.	DEATHS.
Adair.....	109	321	85		120	33	144	155	33	144	168	56
Adams.....	120	345	83	134	309	29	125	209	29	125	117	87
Allamoree	129	445	123	129	120	60	159	120	60	159	191	80
Appanoose.....	233	547	133	250	334	129	306	334	129	306	438	165
Audubon.....	90	399	63	103	193	9	100	193	9	100	170	42
Benton.....	193	476	124	206	194	64	255	407	64	255	407	177
Black Hawk.....	235	613	129	243	347	126	235	303	126	235	303	199
Boone.....	239	630	157	251	304	159	276	438	159	276	438	199
Bremer.....	161	373	91	154	143	86	250	246	86	250	246	104
Buchanan.....	165	364	114	195	155	81	233	224	81	233	224	77
Buena Vista.....	144	393	53	151	187	57	163	343	57	163	343	115
Butler.....	129	434	115	105	210	70	174	231	70	174	231	101
Calhoun.....	103	330	65	123	214	50	133	214	50	133	214	79
Carroll.....	163	592	96	193	123	35	193	232	35	193	232	45
Cass.....	169	513	96	176	273	84	180	399	84	180	399	151
Cedar.....	157	435	81	133	135	61	175	262	61	175	262	114
Cerro Gordo.....	155	433	77	134	213	84	250	165	84	250	165	109
Cherokee.....	120	399	53	143	86	29	185	155	29	185	155	36
Chickasaw.....	.....	411	93	113	84	35	138	81	35	138	81	151
Clarke.....	115	220	75	127	125	14	165	173	14	165	173	33
Clay.....	84	249	43	114	94	19	131	223	19	131	223	48
Clayton.....	160	619	193	159	179	60	253	174	60	253	174	48
Clinton.....	273	905	271	304	603	295	453	397	295	453	397	393
Crawford.....	151	571	136	164	115	33	234	190	33	234	190	58
Dallas.....	189	499	135	206	236	80	184	264	80	184	264	114
Davis.....	144	360	69	173	211	73	264	235	73	264	235	51
Decatur.....	155	351	100	203	163	43	300	233	43	300	233	75

VITAL STATISTICS—CONTINUED.

COUNTIES.	1894.				1895.				1897.			
	MAR- RIAGES.	BIRTHS.	DEATHS.	MAR- RIAGES.	BIRTHS.	DEATHS.	MAR- RIAGES.	BIRTHS.	MAR- RIAGES.	BIRTHS.	DEATHS.	DEATHS.
Delaware.....	128	425	128	157	376	153	193	336	193	336	153	153
Des Moines.....	201	762	209	312	436	379	490	640	490	640	425	425
Dickinson.....	54	167	84	58	84	5	69	130	69	130	27	27
Dubuque.....	406	1,141	303	331	946	436	463	1,061	463	1,061	636	636
Emmet.....	50	168	28	70	110	22	83	159	83	159	30	30
Fayette.....	188	535	166	211	324	130	274	256	274	256	113	113
Floyd.....	146	334	141	169	176	43	310	324	310	324	79	79
Franklin.....	143	300	68	120	183	37	150	184	150	184	67	67
Fremont.....	153	496	90	153	254	48	180	220	180	220	80	80
Greene.....	150	377	85	147	155	36	148	198	148	198	45	45
Grundy.....	124	333	54	118	84	23	130	190	130	190	22	22
Guthrie.....	130	421	101	153	264	59	165	216	165	216	83	83
Hamilton.....	155	498	131	200	310	31	176	303	176	303	51	51
Hancock.....	84	230	58	177	135	55	110	203	110	203	23	23
Hardin.....	206	463	109	174	163	56	317	556	317	556	153	153
Harrison.....	199	612	170	234	433	163	193	370	193	370	105	105
Henry.....	144	398	143	162	218	173	207	266	207	266	194	194
Howard.....	73	316	58	116	147	31	156	180	156	180	62	62
Humboldt.....	54	326	66	88	254	49	123	107	123	107	42	42
Ia.....	104	371	66	108	132	35	146	354	146	354	66	66
Iowa.....	133	478	131	193	204	70	163	304	163	304	109	109
Jackson.....	181	456	132	223	302	114	205	251	205	251	107	107
Jasper.....	201	616	154	223	142	41	235	246	235	246	73	73
Jefferson.....	145	423	97	151	252	78	168	247	168	247	156	156
Johnson.....	209	536	103	229	304	102	251	174	251	174	144	144
Jones.....	174	430	95	183	172	46	192	161	192	161	67	67
Keokuk.....	193	535	135	239	153	45	171	140	171	140	51	51
Kossuth.....	140	563	94	163	183	84	117	278	117	278	47	47
Lee.....	344	906	330	368	224	290	557	412	557	412	432	432
Linn.....	438	1,162	321	430	446	356	593	703	593	703	393	393
Louisa.....	108	306	77	118	175	40	123	306	123	306	130	130
Lucas.....	112	378	98	137	144	31	177	263	177	263	78	78
Lyon.....	90	339	74	73	108	28	108	103	108	103	98	98
Madison.....	161	263	74	142	115	33	202	264	202	264	72	72
Mahaska.....	234	780	240	315	334	180	456	431	456	431	294	294
Marion.....	314	636	171	194	303	117	239	443	239	443	16	16
Marshall.....	251	642	178	296	304	139	396	393	396	393	334	334
Mills.....	130	341	89	143	149	93	204	196	204	196	143	143
Mitchell.....	123	334	83	129	105	141	150	177	150	177	45	45

The foregoing statistics illustrate the results of three methods of collecting data respecting births and deaths as required by the State. For 1894 the data was obtained by the Secretary of State, as shown by the census of 1895; for 1896, by the old method—the physician reporting to the Clerk of the District Court; and for 1897 under the present law—by Assessors, through the County Auditors.

The tables are interesting as affording an opportunity to prove their incorrectness, but worthless as affording any reliable data upon which to base any sanitary conclusions.

A few of the data tabulated may with profit be pointed out. In Audubon county the deaths in 1894 were 63; in 1896, 3; in 1897, 42. In Dickinson county (1894), births, 167; deaths, 84; in 1896, births, 84; deaths, 5; in 1897, births, 130; deaths, 27. In Jasper county, 1894, births, 616; deaths, 154; in 1896, births, 142; deaths, 41; in 1897, births, 246; deaths, 73. In Polk county, 1894, births, 1,731; deaths, 331; 1896, births, 600; deaths, 699; 1897, births, 740, deaths, 655.

It will be noticed that in Polk county the birth rate fell from 1731 in 1894 to 600 in 1896, and 740 in 1897; and the death rate increased from 331 in 1894 to 699 in 1896.

As was said in a former report, it would be better in several respects to make no efforts at all to collect data respecting births and deaths than to lumber up the county and State offices with such unreliable figures.

A better result can be had, and the State should adopt such measures as they have in several other states whereby statistics are collected that are an honor to the states and a benefit to science.

Through the kindness of the State Board of Control there is herewith presented a tabulated statement of the deaths that have occurred in the various institutions named for the years 1897-8 and 1898-9:

VITAL STATISTICS.

209

DEATHS OCCURRING IN STATE INSTITUTIONS UNDER THE BOARD OF CONTROL, FOR THE YEARS
ENDING JUNE 30, 1898 AND 1899.

INSTITUTIONS.	LOCATION.	NUMBER OF DEATHS.						TOTAL FOR NINE-MONTH PERIOD.
		1898.			1899.			
		Male.	Female.	Total.	Male.	Female.	Total.	
		Average population for year ending June 30, 1898.	Average population for year ending June 30, 1899.					
	Martinsville.	5394	5394	40	44	84	45	89
		8104	8104	74	69	143	93	132
		1,0074	1,0074	36	30	66	38	104
		861 5	861 5	2	0	2	0	2
		7554	7554	17	27	44	101	145
		4634	4634	0	0	0	0	0
		4884	4884	0	0	0	0	0
		1764	1764	0	0	0	0	0
		630	630	0	0	0	0	0
		518	518	0	0	0	0	0
	Mitchellville.	9	9	9	9	18	13	31
	Ananias.	9	9	9	9	18	13	31
	St. Madis.	9	9	9	9	18	13	31
	Total.	173	161	579	229	113	342	621

* Not under Board of Control—not given.

X.**WATER.**

The following item was published in the *Iowa Health Bulletin*, August, 1897, by the Secretary of the State Board of Health:

AN URGENT REQUEST.

We would esteem it a great favor if the health officer of every town or city in Iowa in which is established and maintained a public sewer system, or a public water supply (one or both these public improvements), would upon receipt of this number of the *Bulletin*, at once, notify us of the fact. We wish in our forthcoming biennial report, now in preparation, to give the name at least of every such town. If the capacity of the water supply, its method of distribution, the source from which the water is obtained and the means of purification, whether by precipitation or filtration could be reported, it would add greatly to the value of the report.

In regard to sewerage we would be glad to learn the aggregate length of the sewers and the final disposal of the sewage—whether into some body of water, or by irrigation, or by cremation.

Shall we not have such a report from every health officer in the State? The City Clerk or Recorder in many instances could render valuable assistance in compiling this report.

The replies were so few as to be very disappointing and of but little advantage. We take pleasure, however, in presenting in this report the responses received—only wishing that every town or city in Iowa progressive enough to have such an improvement, would have been progressive and benevolent enough to have reported as the following have done.

CEDAR FALLS.

CEDAR FALLS, Iowa, August 30, 1897.

Iowa State Board of Health, Des Moines:

In response to your request in *Iowa Health Bulletin* No. 3, Vol. XI., received yesterday, I have the honor to report that this city has a public water supply which is A No. 1; pure spring water, soft and almost perfectly free from organic matter, and by chemical analysis pronounced exceptionally pure and wholesome; a real blessing, and the supply seems inex-

haustible. We have about seven miles of water mains; capacity of a double set of steam pumps, 2,000,000 gallons per twenty-four hours; used from 175,000 to 200,000 gallons per day. This year our first sewer pipes have been laid, 16,704 lineal feet; final disposal in the Cedar river, below the city.

I want to add that our water comes direct from the springs (walled in) to the pumps and needs no purification. No impurities from the outside can get access to the supply pipes or springs.

Very respectfully submitted,

S. VANDERVAART,
Health Officer.

CENTERVILLE.

Dr. C. B. Bowen, health officer of Centerville, furnishes the following relative to the water supply of that city:

The water system of Centerville belongs to the city. It is under control of the City Council, who make all rules and regulations governing the same. The management is in the hands of the water works commission. This commission consists of one councilman from each ward. This commission is chosen annually, in March, by the new Council.

The water supply is from an artesian well, 1,550 feet deep, located on lot 9, block 1, Drake & Staley's addition to Centerville. On the lots are also located the brick engine house, pump room 18x20, boiler room 20x28, coal and deep well room 20x18, containing the boiler and well pump; also two Dean duplex non-compound pumps for direct pressure, filling the tower and mains at the rate of eighteen gallons a stroke, or 900 to 1,000 gallons per minute. There is also a reservoir into which water from the well is first pumped, capable of holding 265,000 gallons. The tower also stands near the engine house, 100 feet in height. This tank holds 85,000 gallons.

There is a ten-inch pipe connection joining the tank with the water mains, and the entire system is fed in this way. There are seven miles of eight-inch mains and one mile of four-inch mains.

For fire service there is at all times tank pressure, and in addition a system of gates by the use of which direct pressure is given, taking water from the reservoir to the mains under heavy pressure.

The first thought and aim of the Council has been to provide our people with excellent fire protection.

To do this the water works engineer is instructed to keep at all times an ample supply of water in the tank, and to further insure this, rules and regulations have been adopted to provide against "waste" of water by the patrons of the system.

CLINTON.

CLINTON, Iowa, March 1, 1899.

Complying with a request made by you in the *Bulletin* I herewith submit such data as I deem of importance, relative to our water supply, hoping it will be of interest.

The plant is owned and operated by the American Water Works company, and the system is that known as the "direct pressure system." The supply is from five artesian wells, sunk to a depth of from 1,200 to 1,800 feet

through clay, limestone, and into a stratum of Pottsdam sandstone. The overlying bed of limestone is about 400 feet in thickness. The wells are spouters, and the diameters are, respectively:

2-5 inches.....	400,000 gallons each.....	daily
2-8 inches.....	700,000 gallons each.....	daily
1-12 inches.....	900,000 gallons.....	daily

The wells are made to flow into a central reservoir, or can be made to go direct to pumps, which are of the Gaskel compound condensing variety, with duplicate pumps in case one set is disabled; and have a capacity of 12,000,000 gallons per day. Our system of mains aggregate forty-two miles, with 350 fire hydrants. The cost of the system was \$650,000.

The daily consumption of water is about 2,600,000 gallons, and during very warm, dry weather it is sometimes necessary to pump from the river, the water being passed through a filter.

The following quantitative and qualitative analysis, made by Prof. E. G. Smith, of Beloit college, and verified by Mr. Oscar Majer, chemist of this city, shows total solids per gallon of 231 cubic inches:

Sodium sulphate	6.6266
Sodium chloride.....	6.6616
Sodium bicarbonate	6.2824
Calcium bicarbonate	11.2291
Magnesium bicarbonate.....	7.4267
Aluminum } .....	.0174
Feric acid }	
Silica .....	.6124

You will note the predominance of bicarbonates and salts of sodium. You will also note the very small per cent of iron, which makes the water valuable for technical purposes. It would be supposed from the above analysis that the water would be slightly laxative, but this seems not to be the case, and that this water has no superior for all purposes, both for home consumption and the arts. The only trouble we have to contend against is the algæ, which accumulate in the reservoir and mains, and which cause people, who do not know their harmless nature, much unnecessary anxiety, and I am deluged at times with complaints because of the "green stuff" in the water. When the complaints get too frequent I allow the company to pump river water for a few hours, which will destroy the growth, and then people are again happy for awhile. I have recommended a system for destroying this growth, which I hope will be adopted. It is to throw the stream of water high in the air, letting it fall upon screens, thereby becoming aerated; but it is a question whether there would not be more danger from disease germs entering from the air than the benefit derived from killing the algæ. The advent of artesian water in this city has been marked by an almost total extinction of those continued fevers and allied diseases, which are so prevalent under the old system of river water and wells. Enteric troubles are much less frequent; the general health of the city has been improved. The cost to consumers, where no meter is used, is about \$4 per year in dwellings of four rooms. In case of an extensive conflagration the large pumps of Lamb's and also of W. J. Young's mills can be connected with the mains, and drawing water from the river, assist in

case of breakage of pumps at main station or inadequate water supply, something which never yet has occurred. Clinton has a paid fire department, with three stations; has the Gamewell alarm system, with fifty-five boxes.

C. F. KELLOGG,
Health Officer.

CORNING.

Water supply from one well, located within the east border of the town. The well is thirty-eight and one-half feet deep and sixteen feet in diameter, the bottom being in yellow clay three feet above rock-bed. The water is raised into a wooden tank, the top of which is 240 feet above the pumps, whence it is supplied by gravity to 200 consumers. The capacity of this tank is 51,000 gallons. There are twenty-eight hydrants and five to six miles of pipe of one to four, six and eight inches. There are two Duplex pumps—capacity of each, 12,000 gallons per hour. Pressure for domestic use—estimated average, twenty-five pounds. Pressure for fire purposes—estimated average, fifty-five pounds. Cost of works, erected in 1888, \$35,000, including \$15,000 unpaid bonds. Annual expense of works, \$1,400, requiring a 5-mill special tax. Average public use, 30,000 gallons every twenty-four hours. No filtration. No analysis. Works owned and operated by the city. No city sewerage. Cesspools common.

A. A. RAWSON,
Health Officer.

ELKADER.

ELKADER, Iowa, September 1, 1897.

J. F. Kennedy, M. D., Secretary, Des Moines, Iowa:

DEAR SIR—Last year we completed our system of water works. The water is supplied to consumers from a reservoir on the hill west of town, 125 feet higher than Front street sidewalks, through 8-inch mains (branch mains 6-inch and 4-inch). The reservoir was (first specification) to be fifty feet long, thirty feet wide, fifteen feet deep. This, however, was changed to a circular reservoir with same capacity. Our well is a flowing well 145 feet deep, 35 feet of St. Peter sandstone, through which the water comes and flows into a large cistern, one-half size of the reservoir on the hill, and is pumped from the cistern with a Gould pump gasoline engine (25-horse power) to the hill reservoir. The pressure with eight feet of water is ninety pounds to the square inch. When we use direct pressure it's 150 pounds to the square inch.

I have asked the council to allow me to send you a sample of this water for test, but they say it's St. Peter sandstone and is first-class water. We are now putting in about 2,400 feet of 8-inch sewer pipe, which empties into the river below town. This is doubtless all of the sewer pipe that will be used for some time to come.

Yours respectfully,

G. M. GIFFORD,
Town Recorder.

GRUNDY CENTER.

Deep wells, equipped with steam pumps and stand-pipe of steel; capacity 3,000 barrels. Iron mains 2½ miles. Water pumped directly into the mains and forced into stand-pipe. No method of purification, unless possibly precipitation in stand-pipe. No system of sewerage.

Respectfully submitted,

J. D. BURNS, M. D.,
Health Physician.

IOWA CITY.

IOWA CITY, September 9, 1897.

J. F. Kennedy, M. D., Secretary State Board of Health, Des Moines, Iowa:

DEAR SIR—In response to your request, as published in the last August number of the *Health Bulletin*, I have to report on the water and sewer systems of Iowa City, as follows: Capacity of water supply, 2,500,000 gallons per day, distributed by direct pressure, purified by sand filtering in galleries under the bed of the Iowa river, the source of supply.

Length of sewer, including that now in process of construction in Iowa City, 10½ miles. Final disposal of sewage in Iowa river, immediately below city.

Truly yours,

FREDERICK LLYOD, M. D.,
Health Officer.

OXFORD JUNCTION.

Our water works system has been set in operation to-day, though not quite complete. The town is so compactly built that our 700 feet of spiral riveted steel pipe, eleven fire hydrants, 800 feet best two-inch hose, with a 20,000-gallon tank at an elevation of eighty feet, and water supplied by a 5x6 Gould Duplex pump, will give us ample fire protection and furnish all with pure water who may desire to use it. Our town owns and will operate the plant, the total cost of which will be about \$5,000. The work was let by contract to a resident of this place, who also furnished all the material except the pump.

The water is obtained from a well twelve feet in diameter and twenty feet deep, sunk in what was once a river bed—one and one-half miles from the river. The soil is gravel and sand, and the well is walled with rock laid in cement. The supply is inexhaustible, and the quality unsurpassed from a sanitary standpoint—being clear, pleasant-tasted and perfectly free from sediment. There are no sources of contamination whatever. The cost of the well when finished will be \$300. Our population is about 900.

J. K. BLOOM,
Recorder.

SHENANDOAH.

SHENANDOAH, Iowa, June 23, 1898.

J. F. Kennedy, M. D., Secretary State Board of Health:

DEAR SIR—Replying to request in late number of *Bulletin*: Our city has 6½ miles of water pipes; 6,380 feet of 10-inch, 320 feet of 8-inch, 8,980 feet of 6-inch, 16,530 feet of 4 inch; steel stand-pipe, capacity 144,000 gallons;

elevation of top of stand-pipe above pumps, 173 feet; 2 Dean pumps, capacity of 750,000 each; 40 fire hydrants, 310 consumers; daily consumption, 160,000 gallons; Cook point system of wells; depth of wells, from 36 to 48 feet, in water-bearing sand; splendid water. Fire pressure from standpipe in main part of city, 87 pounds; owned by the city; cost, \$37,335.79; bonds outstanding, \$20,000; the difference is made up from a 5-mill water tax; it is a little more than paying operating expenses, exclusive of furnishing fire protection.

Trusting that I have answered your inquiry, I am,
Very respectfully,

C. M. CONWAY,
Mayor.

STORM LAKE.

STORM LAKE, Iowa, September 6, 1897.

Dr. J. F. Kennedy, Des Moines, Iowa:

MY DEAR SIR—In compliance with your request in the *Bulletin* I write to notify you that we have a public water supply. The majority here obtain water from wells, though some use the public water.

The water is obtained from the lake, which covers about six sections of land. There was once a filter, but it is not in use now, and there is no means of purification. The drainage from the south half of town, the filth from camp-meetings and picnic parties, as well as from large numbers who camp by the lake, finds its way into the lake along with dead hogs and dirty humanity. And yet there are those who claim it is the purest water in the world. The regulations in regard to vaccination seem to have been ignored heretofore, and I expect to meet some opposition to it.

Truly yours,

A. C. WOODRUFF,
Health Officer.

WALCOTT.

The following interesting report of the public water supply of Walcott has been kindly furnished by Dr. Ernest T. Kegel. This little prairie town is really to be congratulated for its enterprise. We are reminded of the local aphorism, "Of all that is good, Iowa affords the best," and this effort to get the best water is not confined to towns with their thousands of people, but to our villages as well:

About two years ago the city council and citizens of our little village came to the conclusion to erect a good water system for supplying the town with water and for fire protection.

The idea was carried out immediately, and to-day we can pride ourselves of one of the best systems for a small place like ours (population about four hundred).

The water is obtained from a drilled well about one hundred and fifty feet deep, through rock, and the supply is inexhaustible and quality very good.

The tank rests upon a sixty-five-foot galvanized-steel tower and holds about forty-seven thousand two hundred and fifty gallons. A five-inch deep well pump, put into action by an eight-horse-power gasoline engine, supplies us with water. Eleven hydrants and one thousand feet of two and one-half inch hose will protect us from fire.

The cost of the complete system amounts to \$8,000.

We are glad to quote that during the last cold spell—thirty-two below—not one of our hydrants was frozen, which certainly is a very good test that the system is a good one.

The town of Walcott never issued any bonds on that account, and in about a year we hope to pay the balance of \$1,200.

Aside from the fact that a public water supply, if properly guarded and from an uncontaminated source, and free from objectionable mineral substances, is greatly to be preferred for sanitary reasons, to the wells usually found in towns and cities, is the important fact that no place can have a sewerage system without a water system. Hence the first step and the most essential step toward the sanitary disposition of sewage is an effective public water system.

WATER POLLUTION.

Prof. S. R. Macy, chemist of the State Board of Health, Highland Park college, Des Moines, has furnished the following upon the pollution of water:

The water question of a community is an all important one, and should be given much attention. Water turns the wheels of commerce, quenches the thirst of man and beast, and contributes to progress and civilization in many ways, too numerous to mention.

Yet, until late years, very little attention has been given to this all-important subject. Progress along this line is to be found chiefly in our cities and larger towns, yet one will learn of many farmers looking after their water supply in a truly scientific way.

It is my purpose, in this short report, to give an account of some of the cases with which I have come in contact during the past two years.

These cases are very important ones, and each serves to bring before us a new point.

CASE OF POLLUTION FROM ANIMALS STANDING AROUND A WELL:

I was requested to examine the water from a well situated at the north-east corner of a public square in an Iowa town of about 1,200. I found the well in question, at the busiest corner of the square, with very nearly level ground for some distance each way. The postoffice and all the most importance offices and business houses were on this corner. The earth was of such a nature that water readily entered it and passed from sight.

I made the examination one busy day. Early in the morning of this day the hitching posts near this well were in use. This explained why

there was, as I noticed upon close examination, a gradual slope toward the well from along the line of these hitching posts. It is needless to say that a large amount of filth found its way through the soil into this well. Now, the water was cool, tasted well, and was exceedingly clear for a surface water, and yet, upon analysis, found to be highly polluted. As strange as it may seem, it was almost impossible for me to convince many parties that the water was unfit for use. In fact, I utterly failed, until I evaporated some of it in a pan and let them smell of the residue.

There are many such cases where the conditions are never improved, and oftentimes sickness is the result. We are familiar with instances where chickens, dogs, etc., are allowed to walk over a more or less open platform surrounding a pump or well, when water will wash the filth into the well. We see the same result where stock are allowed to water near a well, and the ground becomes beaten down low around it. In all these cases the source of contamination should be removed as soon as possible.

Some will say that the water tastes so good and is so very clear that it must, therefore, be pure. This is no evidence of its purity. The facts are, that the reason it tastes good is because they have become accustomed to the taste, on the same principle that tobacco tastes good to one accustomed to its use, and very disagreeable to those who do not use it.

The conditions named above are applicable to all shallow wells; also to deep wells to the extent that the surface water is not shut off. Therefore, in examining water supplies, it is very necessary to take all these facts into consideration.

CASE OF WELL FURNISHING PURE WATER, AND LOCATED VERY NEAR A PRIVY VAULT:

In contrast with the above case, I will give that of a well in the city of Des Moines. There are wells within a quarter of a mile that furnish very bad water and are unfit for use, while the well in question furnishes water which, upon analysis, gives a result better than the water from our city water supply. This well is very near a privy vault, in blue clay. I have never been able to trace any connection whatever between the vault and the well. It is, however, exceedingly dangerous to use water from a well so near a possible source of pollution, without first making sure the absence of any connection between the well and the suspected sources of pollution.

The matter of detecting and tracing such connections is a very simple one when placed in the hands of competent parties. Some of these connections between flowing springs and wells may be noticed after a heavy rainfall. In fact, any spring or well that is visibly affected immediately after a rainfall should be looked upon with suspicion.

CASE OF POLLUTION BY COAL MEASURES, THE FOREIGN SUBSTANCE BEING MAINLY MINERAL:

A third very interesting case may be found in a so-called mineral water taken from a well not over twenty feet deep. This well is located in the Des Moines river bottom near the bluffs, where the remains of old cold tunnels and shafts may be found. This water has been analyzed by myself and others. All agree that it is unfit for use; but certain chemists seem to think it heavily charged with sewage from some cesspool on the hill. This, however, is not the case, as the water in fact is almost free

from bacteria, but heavily charged with iron and ammonia salts. The power of the water to reduce oxidizing agents (potassium permanganate) was attributed to organic matter (sewage), but such is not the case. Its reducing power is due to iron salts that come from beneath the old coal measures. The water is very acid, and contains a large amount of calcium and magnesium salts. All these render the water almost antiseptic, and, because of the large amount of mineral matter, unfit for either domestic or medicinal use.

It is unfortunate that many persons take a report of an analysis of water to be a recommendation for its good qualities. Such is not the case. The report of an analysis simply shows its composition. Some physician should report on its qualities as a healthful drink, after making a careful study of its composition.

CASE OF POLLUTION OF RIVER BY WATER FROM FACTORY:

The pollution of our rivers is coming to be a question of great importance, for many reasons. First, the water in many cases is used for a city or town supply. Second, pollution of river water may kill the fish and in this way supply the river with further pollution, which may be very offensive.

During the summer and fall of 1898, we had just such a case in the pollution of the Iowa river by the refuse matter from the glucose works at Marshalltown. At a certain stage in the manufacture of glucose from corn, sulphur fumes (sulphur dioxide) is used. This sulphur passes into the refuse that flows from the glucose works into the main sewer of the city of Marshalltown, then into the Iowa river. Now, the presence of sulphur compounds in water in the absence of iron cause *begiatoa alba* to form very rapidly, giving rise to sulphuretted hydrogen and other compounds. In the presence of organic matter in the water, these compounds turn the water an inky black. Such compounds in the water not only deprive it of its oxygen held in solution, which sustains fish life, but decomposes nitrates and nitrites. It then follows that the fish must come to the surface for a supply of air that contains free oxygen.

All of the above conditions were found to prevail in the pollution of the Iowa river by the glucose works. Thousands of fish died in the river and the reservoir at Tama, Iowa, and contributed to the already highly polluted condition of the river. Business along the river and at Tama was greatly interfered with. Dr. Kennedy and myself went over the ground together, and at different times, and found the conditions as above described.

This suggests that we must look after the disposal of our sewage and waste material from manufacturing establishments. This will, in many cases, be attended with great cost. We should not, however, endanger the public health. It would be better to do without certain industries in our community. But that is not at all necessary. The refuses can be taken care of and the manufacturers still profit.

My work as chemist to the State Board of Health has placed me in contact with a line of work worthy of the highest commendation, that of the Dairy Commissioner. That office is doing much toward the betterment of our dairy system; looking after cleanliness in the creameries and dairy establishments, the keeping of cows in a clean, healthy place and feeding

them, good wholesome food. That office is also doing a great work in looking after the adulteration of milk, butter and cheese. In fact, all is being done that can be done with the present money set apart for that purpose.

The work of chemical investigation should be provided for in other lines. Say a pure food law in connection with the Dairy Commissioner and State Board of Health; a pure drug law with the Pharmacy Board, and money provided by our legislature for work along this line.

XI.

FOOD PRESERVATIVES.

There are a great many preparations being sold as preservatives of milk and other articles of food, including fruits.

Boracic acid, formaldehyde, and salicylic acid are the principal agents and they are sold under various fancy names such as "Freezene," "Ozaline," "Milk Sweet," "Preservaline," "Icealine," etc.

The use of any of these in milk offered for sale is a violation of section 4990 of the code, which says: "The addition of water or any other substance or thing to whole milk, or skimmed milk or partially skimmed milk is hereby declared an adulteration."

The penalty for selling adulterated milk under section 4989 is a fine of "not less than twenty-five nor more than one hundred dollars, and shall be liable for double damages to the person or persons upon which such frauds shall be committed."

Until formaldehyde came into use, and is sold under various "trade marks," salicylic acid was the favorite preservative, for fruits especially. In regard to this preparation the *Iowa Health Bulletin*, August, 1897, had this to say:

Now, that the season for canning and preserving fruits is at hand, it is well to caution our readers against the use of chemicals usually sold as fruit-preserving compounds. At fairs, and on many other occasions, fancy samples of fruit are shown that are very attractive, and the progressive housewife is assured that the preparation is inexpensive, effective and harmless. We saw a circular advertising such a compound recently, in which the declaration was made that the preparation used by their company did not contain any salicylates. A formula furnished by the company in question, giving the ingredients in the preparation, shows in a given amount 50 per cent of salicylic acid, and 25 per cent of salicylate of sodium—in all 75 per cent of salicylates! We do not claim that such compounds are frauds so far as preserving the fruit is concerned, but they are frauds when they are declared not to contain any salicylic acid, and warranted not to be injurious to the health.

The important question is the healthfulness of food so preserved. The Secretary of the State Board of Health, in the seventh biennial report to Governor Larrabee (1889), has the following, which we reproduce at this time, as it reflects not only the opinion of the editor of the *Bulletin*, but of every member of the State Board of Health, so far as we have heard an expression:

This acid is obtained from the phenates of barium and calcium. Its use for preserving food and drink became so general in France that the French Academy of Medicine, at the request of the government, took up the matter, and appointed a committee consisting of such eminent physicians and chemists as Bertholet, Bergeron, Roussel, Proust, Brouardel, Vallin, and others, to investigate it. The committee reported to the government that the daily and long continued use of even small doses of salicylic acid had been demonstrated by medical observation to produce evil effects in feeble and sick persons, and that the use of it as a preservative of food or drink should therefore be forbidden.

Upon the report of this committee the use of this acid as a preservative of food or drink was prohibited by the government of France.

In a case brought before the Paris Court of Appeals for violation of this law, M. Muller, the presiding judge, in giving his opinion, said: "Salicylic acid is really a medicine, sometimes useful, often dangerous, the administration of which should be made under the direction of an experienced person, and which the government cannot relegate to merchants, acting only for the interest of their business, as the purchaser may thus receive injury to his health by the employment of this pretended preservative agent, which, when in doses more or less frequently repeated, may act greatly to his prejudice."

M. Vallin, the eminent chemist and physician, in his report to the French government, says: "The continuous taking of small quantities of salicylic acid, or its derivations, is injurious to health, especially in the case of aged persons, and those whose renal and digestive organs are not perfectly sound."

Professor E. Englehardt says: "I am against the use of this acid for the preservation of food or drink."

Professor Hilgard says: "This acid is not a proper substance for daily use. It has a tendency to produce kidney troubles, or to aggravate them. Its continued use tends to injure the bones and teeth. It hinders digestion, and the proper chemical action of the various digestive fluids."

Prof. F. de Chaumont, the eminent French chemist, sanitarian and physician, in an address before the International Health Exposition, at London, in 1884, said of the use of this acid for preserving food: "It has been found that this is not a very desirable thing to take into the system."

The opinion of those who have given the subject the most critical investigation is adverse to the use of this acid for preserving food.

The campaign against this acid was such that it has largely gone out of use.

There is quite a good deal of scientific enquiry as to the harmfulness of boracic acid and formaldehyde. There was so much acrimonious debate respecting "embalmed beef" during the

Spanish-American war that the attention of the people of this, and all countries, has been and is now directed to an investigation of scientific methods of preserving food without cold storage.

The State Board of Health of Maine has taken up this line of work, and is addressing enquiries to state and city health departments with a view of determining, if possible, the amount, if any, of boracic acid or formaldehyde that may be used with safety and without in any way interfering with the digestive or nutritive properties of food.

It must not be forgotten that from time immemorial chemical agents have been called into requisition as food preservatives. Common salt and saltpetre are familiar examples.

Chemistry is a progressive science, and it would be strange if new agents were not discovered that would be more efficient and reliable, as well as harmless, than the familiar ones so long in use. Certainly all experiments and investigations along this line are not only commendable, but should have the hearty co operation of all scientists—especially health organizations.

XII.

HEALTH LITERATURE.

The principal method adopted by the State Board of Health for protecting, improving, and maintaining the health of the people of the State is by its literature upon sanitary matters sent into all parts of the State.

The following are some of the publications of the Board:

The *Iowa Health Bulletin*; Regulations for Local Boards of Health, Regulations for the Quarantine and Disinfection of Contagious Diseases; Restriction and Prevention of Contagious Diseases in Public and Private Schools; Ordinance for the Protection of the Public Health in Cities and Towns; Ordinance for the Protection of the Public Health in District Townships; Rules for the Prevention and Restriction of Contagious Diseases Among Domestic Animals; Rules and Regulations for the Disinfection of Woolen Rag Mattresses, Bed Quilts, Carpets, Rugs and Upholstered Furniture; Ventilation; Smallpox Hospitals; Emergency Hospitals; Disposal of Sewage of Isolated Country Houses; School Hygiene, with Special Reference to the Lighting and Seating of Schoolhouses; Rules and Regulations for the Inspection of Illuminating Oils and Linseed Oil; Kerosene Oil—What to Buy, Lamps—How to Use Them, Gasoline and Its Dangers; Regulations for the Use of Kerosene, Gasoline and Petroleum Products; The Hygienic Treatment of Tuberculosis; Information Respecting Tuberculosis; and Rules for the Transportation of Corpses.

These circulars and pamphlets are sent to city and township clerks and to health officers upon the notification of any outbreak of disease, and to any other person asking for them.

The result has been that the local boards of health of the State are well organized, and in a condition to promptly and efficiently institute measures for the protection of the people.

Besides these there are special circulars to meet emergencies, etc.

There are 6,000 copies of the *Health Bulletin* published monthly. This is a pamphlet of sixteen pages and is the official organ of the Board. It has been published for over twelve years and is edited by the Secretary. It is in great demand, as it contains not only the official edicts of the Board, but a great variety of useful and interesting information upon sanitary matters. It is sent to our representatives in Congress; to every supreme judge; to the judges of the district courts; to every county clerk, county attorney, superintendent of schools; to the presidents and libraries of all colleges in the State; to the superintendents of all public schools; to every mayor, clerk and city physician of every city and town; and to every township clerk; besides to a great many physicians and others who have asked for it. It goes to every state in the Union, and to a great many foreign countries, and has received a great many warm commendations. By its monthly visits the State and local boards are brought into intimate touch with each other.

The cost of printing and distributing this literature is paid out of the annual appropriation for the Board, and it must be conceded is money well spent.

XIII.

FURTHER LEGISLATION.

Among the items suggested by section 2565 of the code to be embraced in the biennial report of the Secretary are "such suggestions as to further legislation as may be thought advisable."

In accordance therewith the following suggestions are presented:

STATE BOARD OF HEALTH—PERSONNEL.

First.—Section 2564. The clause, "but no one of the seven physicians hereafter appointed shall be an officer or member of the faculty of any medical school," should be repealed. There was never any valid reason for its enactment. It was only recently enacted at the instigation of a medical school now defunct. The Governor should have the right to select the best possible men in the State to serve on the Board. Under this provision a teacher of hygiene or sanitary science, though in every way the best equipped of any one else in the State, is ineligible. It was enacted when the statute required the State Board of Medical Examiners to issue a certificate upon a diploma granted by a medical college in good standing. The law has been changed, however, and the statute itself, section 2582, declares that all persons desiring to practice medicine in Iowa shall not only be graduates of medical colleges conforming to certain conditions specified in the section, but must also be examined before the Board. As the examination is made by the Secretary, and the candidates are given confidential numbers, no member of the Board can know whose papers are being rated by him, nor the school from which he is graduated, and hence there can be no partiality whatever as to college or candidate. This being the fact it is only just that a provision that is a serious reflection upon a physician connected with a medical college should be removed from the statute.

RECORD OF MARRIAGES.

Second.—Section 2567 should have the following added to it, after the word “death,” *together with a report of the marriages that have occurred within the county during the period named above.*

This is evidently the intent of the law as shown by section 2565. The reports of births and deaths, as shown elsewhere under “vital statistics,” are very incomplete, and sections 2566 and 2567 should be so amended as to secure better results.

QUARANTINE.

Third.—The last sentence of section 2568 should be so changed as to read *shall be declared* instead of “may be declared.” The law previously read “shall.” As it is there were many instances during the last biennial period, where for reasons personal, social, political, or financial, Mayors or Clerks refused or neglected to establish quarantine. If an infectious disease, dangerous to the public health, and declared quarantinable by the State Board of Health breaks out in a community the matter of establishing, maintaining, or releasing quarantine should not be left to any whim or caprice of the Mayor or Township Clerk, as the case may be. These officers themselves would rather have the law mandatory than optional, and thus more easily refuse any appeal for favoritism.

The following, furnished by a very efficient health officer, is respectfully submitted, also as an addition to section 2568: “Any person who shall purposely conceal or withhold information of any case of smallpox, varioloid, cholera, diphtheria, scarlet fever or other quarantinable disease, from the legally constituted public health authorities of the locality in which the same may occur, shall be punished on conviction thereof, by a fine of not less than one hundred, or more than five hundred dollars, or by imprisonment for not less than six nor more than twelve months, or by both fine and imprisonment at the discretion of the court; and in case the person so offending is a physician or holds a license from the State Board of Medical Examiners, his license shall be suspended, and on conviction of a second offense, it shall be permanently revoked by said Board.”

SECRETARY'S SALARY.

Governor Larrabee, in his biennial message to the Twenty-third General Assembly (1890), in speaking of the State Board of Health and commending its work, said: “I consider the

compensation of the Secretary inadequate for the work and responsibility of the position, and recommend that it be increased." This was ten years ago, and, although the work and responsibilities have greatly increased since then, the salary of the Secretary remains as it was twenty years ago, when it was thought the position was merely a clerical one, and a non-professional man was selected to do the work. Other states pay their secretaries for duties not so varied or onerous as are required of the Secretary of this Board, from \$2,000 to \$3,500. The present incumbent is a graduate of one of the oldest and best literary colleges of the east and of the medical department of the University of New York City; was at the time of his election to the office, a physician of over twenty-five years of experience, part of it as Assistant Surgeon in the regular army. No one less equipped, from a literary or professional standpoint, should be asked or permitted to assume the duties and responsibilities of such a position. He should, in addition to being well equipped along professional and literary lines, have excellent judgment and executive ability, since he is the executive officer of the Board, and is held largely responsible for the health interests of the State. He is the editor of the *Health Bulletin* and the Secretary of the State Board of Medical Examiners as well, for which services he receives no compensation whatever. The compensation for all these services, as specified by section 2574, is "not to exceed twelve hundred (1,200) dollars yearly"!

PRACTICE OF MEDICINE.

Chapter 17, title xii, of the code, since January 1, 1899, has become somewhat contradictory, and should be so amended as to be consistent throughout.

After the word "chapter," in line 5, the following from section 2582 should be inserted:

"All persons beginning the practice of medicine in the State of Iowa must submit to an examination as set forth in this chapter (section), and, in addition thereto, shall present diplomas from medical colleges recognized as in good standing by the State Board of Medical Examiners, and all persons receiving their diplomas subsequent to January 1, 1899, shall present evidence of having attended four full courses of study of not less than twenty-six weeks each, no two of which shall

have been given in any one year." The balance of section 2582 should be repealed.

Beginning with the word "graduates" in line 27, section 2576, all the words following should be stricken out to include the word "examination" in line 84.

EXEMPTIONS.

The following words should be stricken from section 2579: After the word "board," in line 15, strike out all to include the word "locality," in line 18. This clause was not in the revised code as it came from the commission, but was injected into it by an amendment offered on the floor of the Senate. The clause is not only a menace to the whole chapter, but is vicious in its practical application. Because of its presence Judge Gamble, of the district court, Knoxville, declared the law unconstitutional, and upon a writ of *habeas corpus* released one of the most notorious traveling physicians that ever infested the State, though he had no certificate as a physician, or license as an itinerant, as contemplated by sections 2576 and 2581.

After quoting authorities and citing provisions in different sections of chapter 17, the code, Judge Gamble, in reference to the clause above cited, says, in a communication to the Secretary:

Section 2579 defines who are practioners, and after doing so, provides that it shall not be construed to prohibit certain parties therein named, including the following: "nor to physicians, as defined herein, who have been in practice in this State for five consecutive years, three years of which time shall have been in one locality." The act divides medical practitioners into two classes, those who have practiced five years in the State, three years of which shall have been in one locality, and those who have not so practiced. On the latter class a burden of an examination, a fee of \$20, the recording of their certificate and the payment of a fee of 50 cents, is imposed, and must first be complied with before they can lawfully practice medicine after the taking effect of the law, no matter what may have been their ability, skill or qualification. When the law took effect the five years man with three years in one locality, was not in any manner affected thereby. He was not required to do anything to qualify him to practice. He could pursue the even tenor of his way without any burden imposed upon him whatever. No matter what his qualifications or fitness to practice medicine, five years' practice, with three of it in one locality, fits and qualifies him for continued practice, under the act whose aim and object is the protection of the public against incompetent persons engaging in the practice of medicine and surgery by restricting the practice to those sufficiently learned in that profession. While his neighbor who may be his equal, if not his superior in point of intelligence, ability, fitness and practice, and may have practiced consecutively for ten years in Iowa, but only two years

and 364 days in one locality, is compelled to apply for examination, and as a condition precedent thereto must first put up a fee of \$20, record his certificate, if he is fortunate enough to receive one, and pay the recording fee in the county where he resides, and if he thereafter removes therefrom must have his certificate again recorded in the county to which he moves before he can safely enter the practice.

No difference how long a man may have practiced in the State unless three years of his practice has been in one locality, he is not exempt from the burdens imposed by the law. Exemption from the burdens imposed is made to depend not upon the integrity, education and medical skill, but upon a continuous practice in one locality. The test is not merit, but unchanged locality for the time mentioned. For these reasons, and based on the authorities cited herein, and the many authorities cited in those opinions, I think our law makes an arbitrary discrimination, laying a charge or burden on one class of physicians and citizens of the State not imposed upon others, in permitting some and forbidding others to carry on their business without regard to their competency or skill. Such legislation is not the equality of the constitution in my judgment, nor does it grant to each citizen of the same class or profession the equal protection of the law.

In *Barbier v. Connolly*, 113 U. S., page 31, the court say that the fourteenth amendment "undoubtedly intended, not only that there should be no arbitrary deprivation of life or liberty, or arbitrary spoliation of property, but that equal protection and security should be given to all, under like circumstances, in the enjoyments of their personal and civil rights; that all persons should be equally entitled to pursue their happiness, and acquire and enjoy property; that they should have like access to the courts of the country for the protection of their person and property, the prevention and redress of wrongs, and the enforcement of contracts; that no impediment should be interposed to the pursuits of any one, except as applied to the same pursuits by others, under like circumstances; that no greater burdens should be laid upon one than are laid upon others in the same calling and condition. * * * Class legislation, discriminating against some and favoring others, is prohibited."

It was because of these things that I discharged Dr. McClelland when before me as above stated. I regretted very much the necessity of the ruling, but it was my best judgment that the law, for the reasons I have herein stated, was unconstitutional, and that the discrimination therein made between citizens of the same class and profession was fatal thereto, and could not be enforced.

Dr. McClelland was not charged under the law as an itinerant physician, but as hereinbefore stated. In passing upon the question before me I incidentally dropped the remark that I had doubts about enforcing section 2581, in view of the holding on the other sections of the law. While not deciding that question, I suggest that as I read that section, before a certificate can be issued to an itinerant physician, he must have the regular certificate required of all physicians not exempted from the law, and if the law requiring such certificates is not valid, there may be some question about the right to issue the certificate provided for in said section 2581. I only throw this in as a suggestion for you to think over.

That the legislature has the power to pass laws regulating the practice of medicine by general laws, applicable alike to all who engage therein cannot be doubted, and such laws are almost uniformly upheld. But they must, or should operate equally upon all with no burdens for one that are not to be borne by others similarly situated.

The only exception the writer has to the foregoing decision is that the clause injected into the law upon which the opinion is rendered should invalidate the entire statute.

It was expected that if anyone was arrested for practicing without a certificate and claimed that he had been practicing for five consecutive years—three years in one locality, the courts would hold that the particular clause granting such exemption would be declared unconstitutional, but that the remainder of the statute would remain in force.

This opinion of Judge Gamble should have such consideration, by the General Assembly, as will lead to the elimination of the invalidating clause, which should never have found a place in the code.

COMPENSATION.

Section 2583 should be so amended as to provide for a compensation to the Secretary, as under the statute, though the duties are onerous and responsible, there is no provision for any pay whatever, except for expenses incurred for services that "cannot be performed at the capital." Within the next biennial period the fees received under this chapter would pay the Secretary a reasonable compensation, meet all the other expenses named and pay into the State Treasury a sum sufficient to refund the amount paid on behalf of the State Board of Health. Thus the State would have the services of both boards without any outlay of money.

PRACTICE OF OSTEOPATHY.

The law relating to the practice of Osteopathy is chapter 69, Laws Twenty-seventh General Assembly.

No argument will be needed to show why such a law, when contrasted with chapter 17, title XII, the Code, should not be materially amended or repealed. Without taking space here to present the text of both statutes as they will be found in the appendix of this report, the practical features of both are presented in parallel columns:

Chapter 17, Title XII, Code—Physicians.

COURSE OF PROFESSIONAL STUDY.

A diploma granted upon "attendance upon four full courses of study of not less than twenty-six weeks each, no two of which courses shall have been given in any one year, in a medical college recognized by the Board as of good standing."

Time required to graduate as a **PHYSICIAN**, *four years*,

FEEES.

After graduation *an examination* before the Board of Medical Examiners for which a fee of twenty (\$20) dollars is paid, which pays for the certificate *if successful*.

RECORDING CERTIFICATES.

With County Recorder—fee fifty cents.

GROUND'S FOR WITHHOLDING CERTIFICATES. (Sec. 2578.)

May be refused to anyone who is not of good moral character.

REVOCATION. (Sec. 2578.)

Loss of character, incompetency, habitual intoxication and false statements as to graduation. Revocation done by Board of *Medical Examiners* granting the certificate. After revocation holder cannot practice in the State.

Chapter 69, Twenty-seventh General Assembly.

OSTEOPATHS.

COURSE OF PROFESSIONAL STUDY.

"A diploma from a legally incorporated and regularly conducted school of Osteopathy of good repute as such, and wherein the course of study comprises a term of at least twenty months, or four terms of five months each, in actual attendance at such school."

Time required to graduate as an **OSTEOPATH**, *twenty months*, or one year and eight months.

FEEES.

After graduation *no examination* and no fee unless a certificate is granted, for which the fee is twenty (\$20) dollars.

RECORDING CERTIFICATES.

With "County Clerk"—an unknown officer—fee one dollar.

(Why "physicians" should be required to record their certificates in one office and "Osteopaths in another; and why the one should pay twice as much as the other, when both certificates are alike in form, can hardly be explained on any reasonable hypothesis.)

GROUND'S FOR WITHHOLDING CERTIFICATES.

May be granted without respect to character.

REVOCATION.

Fraudulent misrepresentation in procuring certificate, violation of its provisions, gross immorality. Revocation done by State Board of *Health*—a body having nothing whatever to do with the practice of healing and that did not grant the certificate. No prohibition against

The certificate (2579) confers the right to practice medicine, surgery and obstetrics.

PENALTIES—(2580).

Presenting a fraudulent diploma, or one of which the applicant is not the rightful owner, filing or attempting to file the certificate of another as his own, falsely personating any one to whom a certificate was given, practicing without obtaining and recording the certificate or practicing after the certificate has been revoked a fine of "not less than \$300 nor more than \$500 and costs of prosecution, and stand committed to the county jail until such fine is paid." If he shall attempt to file with the recorder the certificate of another with the name of the party to whom it was issued erased and his own inserted or file with the Board of Medical Examiners any false affidavit of, he is declared guilty of forgery.

ITINERANT PHYSICIANS.

Section 2581.

Every "itinerant physician" required to have a *certificate* as a *physician* based upon the above named conditions, and an "itinerant physician's" *license*, for which he pays \$250 annually.

The penalty is three to five hundred dollars fine and costs of prosecution, with commitment to jail until paid, if without the physician's *certificate*, and the same if without the itinerant's *license*—aggregating \$600 to \$1,000 fine and costs and commitment to jail until paid

practicing Osteopathy after revocation of certificate.

The certificate confers the right to practice Osteopathy but not to prescribe or use drugs, nor to perform major or operative surgery.

Osteopathy is nowhere defined or its methods hinted at in the chapter except negatively.

PENALTIES.

CAN DO ALL THE THINGS PROHIBITED "PHYSICIANS" WITHOUT ANY PRESCRIBED PENALTY.

THE OSTEOPATH CAN PRACTICE ANYWHERE AND EVERYWHERE THROUGHOUT THE STATE, WITHOUT A CERTIFICATE, OR A \$250 LICENSE, AND BE SUBJECT TO NO FINE OR PENALTY WHATEVER!!

Each itinerant *physician* pays directly into the State treasury \$250 annually.

WHO ARE PHYSICIANS? (2579)

"Any person shall be held as practicing medicine, surgery, obstetrics, or to be a physician, within the meaning of this chapter, who shall publicly profess to be a physician, surgeon or obstetrician, and assume the duties, or who shall make a practice of prescribing or of prescribing and furnishing medicine for the sick, or who shall publicly profess to cure or heal."

Under this section any one "who shall publicly profess to cure or heal" by any means or method whatever, shall be held to be a physician, and becomes subject to the penalties prescribed in sections 2580 and 2581. This includes homeopaths eclectics, regulars, faith-healers, magnetic-healers, physio-medics, electropaths, Christian scientists, vitapathists, and every system or method except osteopathy.

NO ITINERANT OSTEOPATH PAYS ANYTHING INTO THE STATE TREASURY.

WHO ARE OSTEOPATHS? (Sec. 5)

ANY ONE WHO PUBLICLY PROFESSES TO CURE OR HEAL, OR PRACTICE OBSTETRICS, OR SURGERY, EXCEPTING "MAJOR OR OPERATIVE SURGERY," BY THE SYSTEM, METHOD OR SCIENCE COMMONLY KNOWN AS OSTEOPATHY!

They may do anything and treat any disease except administer drugs, or certain methods of surgery, and it is declared not to be practicing medicine or surgery if they call it osteopathy!!

They may attend women "in labor" and it is declared not to be "obstetrics" if they call it osteopathy!!!

And what is osteopathy? The law nowhere defines it.

The word Osteopathy is a compound of two Greek words, "*osteon*" (bone) and "*pathos*," to suffer, and therefore means bone disease or bone suffering.

What has consumption to do with bone disease? Or what has diphtheria, or smallpox, or leprosy, or cholera, or tapeworm, or hydrophobia, or any chemical or mineral poisoning to do with bone disease?

In the absence of any definition by the legislature, the following is the official, technical definition, as formally adopted and promulgated by the highest Osteopathic authority:

Such exact, exhaustive and verifiable knowledge of the structures and functions of the human mechanism, anatomical, physiological and psychological, including the chemistry and physics of its known elements, as has made discoverable certain organic laws and remedial resources within the body itself, by which nature, under the scientific treatment peculiar to Osteopathic practice, apart from all ordinary methods of extraneous, artificial, or medical stimulation, and in harmonious accord with its own mechanical principles, molecular activities, and metabolic processes, may recover from displacements, disorganizations, derangements and conse-

quent disease, and regain its normal equilibrium of form and function in health and strength.

Chapter 69, laws Twenty-seventh General Assembly—the Osteopathic law—is a baby act. It is not only unjustly and dangerously discriminating, but is wholly unsatisfactory to Osteopaths themselves. It was begotten in ignorance, born prematurely, and hence a weakling; was misnamed, and unless regenerated by better ancestors should in kindness to a menaced public be allowed to die unwept.

Section 5 of this chapter speaks of Osteopathy as a "science." Is not this a rather premature claim? Osteopathy has no literature except some periodicals, which, like the literature of proprietary medicine dealers and "patent" almanacs, abound largely in descriptions of wonderful cures, with no failures. There is one exception to this. Elmer D. Barber, D. O., graduate of the American School of Osteopathy, has written and published a work entitled, "Osteopathy Complete," of which he says in a letter to the Secretary: "It is Osteopathy, pure and simple, as taught and practiced in the leading schools, stripped of the veil of mystery in which it has been shrouded." Dr. Barber is the president of the National School and Infirmary of Osteopathy, Kansas City.

It is to be hoped that the law makers of the State and all interested in equitable legislation will carefully study these two statutes as contrasted above. The Osteopaths advertise themselves as "doctors," and to treat all kinds of acute and chronic diseases and to practice obstetrics. They will ask the coming legislature to allow them, in emergencies at least, to use drugs.

It is safe to say that no such piece of hasty, inconsiderate and partial legislation was ever before foisted upon the public.

This is in no way intended as an adverse criticism upon the legislature that enacted it, nor upon the governor who signed it. It was done in the closing days of the legislature, and illustrates the danger of "omnibus" or hasty legislation. It certainly, upon mature reflection, does not commend itself to any one connected with its passage, much less to those whom it was intended to make the special wards of the state.

In the absence of any legal definition of Osteopathy, everyone is left to call himself an Osteopath who chooses to do so, and he is protected by section 5.

A few extracts are given to illustrate the "science(?)" of osteopathy as presented in the only specific work upon the

system known to the writer. The character and symptoms of the diseases will be omitted and the "treatment" alone given.

Mumps.—(p. 270.) "Treatment. (1) Place the hands under the chin and occipital bone, giving gentle extension and rotation of the neck. (2) Manipulate thoroughly all muscles of the neck, being particularly thorough in the region of the parotid gland. These manipulations free the circulation to the head and will cure any case of mumps in a very few days. Treatment should be given each day."

A physician in such a case would enjoin rest and quiet indoors, would hardly give medicine at all; would certainly not twist the neck and rub the cheek and glands, knowing that "in a very few days" the patient would get well without any treatment.

Chicken pox.—(p. 271.) "Treatment. (1) Place the patient on the side; beginning at the upper cervicals, move the muscles upward and outward the entire length of the spinal column, gently but deep. Treat the opposite side in a similar manner. (2) Flex the limbs, one at a time, strongly against the abdomen, giving the knee strong abduction as the limb is extended with a light jerk. (3) Place the hands under the chin and the occipital bone, giving gentle extension and rotation of the head and neck. (4) Draw the arms slowly but strongly above the head as the patient inhales, lowering them with a backward motion. (5) Hold the vaso-motor."

The physician would direct that the child be kept in the house a few days, perhaps administer no medicine at all and let nature cure the disease, which she would do in a very few days.

Diphtheria.—The following is the cause as given by Dr. Barber: "Diphtheria is caused by a contraction of the muscles of the neck and thorax, as well as by a contraction of the muscles of respiration, which, interfering with the circulation of the fluids of the body, cause the inflamed condition of the larynx, bronchial tubes and throat."

There is here no suggestion of infection or contagion and in the treatment no hint as to disinfection, isolation or any measure of prevention. This theory as to its cause hardly commends itself to anyone of ordinary intelligence from the fact that a number of cases may occur in one family.

The treatment recommended is consistent with his theory. It is too lengthy to give in detail. It is all rubbing, twisting the head, moving the muscles, flexion, extension and pressure. As to the membrane he says: "(4) Place the finger in

the patient's mouth and move the muscles of the throat gently; this loosens the membrane, which usually will be immediately expelled."

The doctor is very enthusiastic about his method of treatment, and says: "Diphtheria in its most malignant form has never, in our experience, failed to yield readily to this treatment, instant relief being experienced and a complete cure effected in a very few days. Treatment should be given every six hours, and the vaso-motor center may be held at any time, as it always gives relief."

One more sample will suffice.

Pulmonary tuberculosis, or consumption, page 68.—There is no suggestion as to the disease being caused by a germ or microbe. He says: "We trace consumption to the contracted muscles of the chest." He seems to forget that thousands and thousands of men and women with no chest deformity whatever contract consumption. The details of treatment are too lengthy to be given further than to say that it consists in various forms of manipulation with no suggestion as to the disinfection of the sputa and no hint of a possibility of it being communicated to others.

He says further, on page 71, as to cause and cure: "We have established the fact, beyond the shadow of a doubt, that it is the steady pressure of the contracting muscles that causes this dread disease, and experience has taught us that *until tuberculosis sets in it can be cured*."

This is a most remarkable and scientific (?) statement. The heading of his article is "*Pulmonary Tuberculosis, or Consumption*," and yet he tells his readers that "*until tuberculosis sets in*" tuberculosis can be cured!

In view of all the foregoing facts is there any good reason why this particular school of practice should be shown by the legislature such extraordinary favors, especially when contrasted with physicians, and those who administer no medicines, such as hydropaths, electropaths, etc.?

Physicians are not asking that their requirements to practice their profession be lessened; they ask no lower standard than the one fixed by chapter 17, the code. They cannot, however, see why any one calling himself an "Osteopath," or professing to practice the science (?) commonly known as Osteopathy can do the same things—can treat infectious dis-

eases, such as smallpox, scarlet fever and the like, without any knowledge of prevention, or any efforts to protect the community.

THE STATE AND "CHRISTIAN SCIENCE."*

So inconsistent, so self-contradictory, and so visionary and irrational a thing as is so-called Christian Science, cannot be made a subject of legal action by a State, except by exclusion. The State cannot recognize and treat it as legally tangible, because there is nothing tangible about it. It is not a medical science because it discards all that the world has for centuries regarded as means necessary to the cure of diseases or its mitigation. It does not recognize disease as a corporeal reality; only an illusion of the mind, dispelling which, all so-called disease disappears as a cloudlet blown away by a gentle breeze. It is not a philosophy, because it is but the jargon of misused words, and even then used inconsistently and self-contradictorily. It is not a religion, because there is not a single rational element of religion in it. It is not Christian, because it recognizes not either the fact of sin, or its cure, an atonement. It is the pervision of everything fundamental in Christianity; the gibberish of a disordered mind. It declares that there is no such a reality as disease, yet it claims to cure persons of incurable morbid action by mental, silent argument with the mind of the patient.

When such a piece of superlative nonsense invades the sick chamber, where the State has declared that none but a qualified physician shall enter with means of relief; when such a one recognized by the State, assumes, as its agent, the control and responsibility of the life of a citizen the State can say no to all others. Outside the sick chamber the "Christian Scientist" is a free man. If he chooses to destroy his life by neglecting or spurning the means which both divine and human wisdom have ordained for its preservation, the State cannot legally interfere or intervene. Both declare in effect: "Ephriam is joined to his idols; let him alone." But so far as it takes control of persons, citizens or wards of the State, in a condition which all the world and divine intelligence recognize and designate as a disease or injury — thus far it comes under the cognizance of the State as respects matters that pertain to the medical or surgical care of its citizens, suffering under disease or injury. By attempting to cure disease by silent, mental arguing, and nothing else, it invades the field which the State has circumscribed by a barrier which only those can pass whom the State has recognized by legal provision.

To understand how far "Christian Science" intervenes and opposes or obstructs what the State has ordained, and how positively it negatives what the State deems as essentially necessary, we have but to hear what the revealer of the divine science of healing has declared as the only truth, and what the State has said, and the courts of final jurisdiction have declared to be the will of the State. The contrast and disagreement will appear so great as to forbid all compromise or accommodation, and oblige the extinction of one or the other.

*From *The Medical Herald*, St. Joseph, Mo., June, 1899, by permission of the editor, Hiram Christopher, A. M., M. D.

The author of *Science and Health* says, besides hundreds of other things equally absurd, that "To prevent disease or cure it mentally, let spirit destroy this dream of sense. If you wish to heal by argument, find the type of ailment, get its name, and array your mental plea against the physical. Argue with the patient (mentally, not audibly), that he has no disease, and conform the argument to the evidence. Mentally insist that health is the everlasting fact, and sickness the temporal falsity. * * * If the case to be mentally treated is consumption, take up the leading points included (according to belief) in this disease. Show that it is not inherited; that inflammation, tubercles, hemorrhage, and decomposition are beliefs, images of mortal thought, superimposed upon the body; that they are not the truth of man; that they should be treated as error, and put out of thought. Then these ills will disappear. If the lungs are disappearing, this is but one of the beliefs of the mortal mind. Mortal man will be less mortal when he learns that lungs never sustained existence, and can never destroy God, who is our life." Was such insane jargon ever heard outside the wards of a lunatic asylum? The renowned author does not seem to know the meaning and use of words; yet an inspired revealer ought to have so written as to have given to her revelation some consistency and sense.

Now, what do the courts of final appeal say of the State's relation to medicine; of its means in caring for sick citizens; of the reality of sickness and bodily injury? A legal authority, in a decision, says: "The State has an interest in the life and health of all its citizens, and the law under examination was framed, not to bestow favors upon a particular profession, but to discharge one of the highest duties of the State—that of protecting its citizens from injury and harm."

Of the practice of medicine by which the State cares for the life and health of its citizens, the courts say: "The practice of medicine is a pursuit very generally known and understood, and so, also, is that of surgery. The former includes the application and use of drugs for the purpose of curing, mitigating or alleviating bodily diseases; while the functions of the latter are limited to the manual operations usually performed by surgical instruments or appliances;" and "to allow incompetent and unqualified persons to administer or apply agents, or to perform surgical operations, would be highly dangerous to the health as well as to the lives of the persons who might be operated upon; and there is reason to believe that lasting and serious injuries, as well as loss of life, have been produced by the improper use of medical agents and surgical instruments or appliances. It was the purpose of the Legislature by this act to prevent a continuation of deleterious practices of this nature, and to confine the uses of medicine and operative surgery to a class of persons who, upon examination, should be found competent and qualified to follow their professional pursuits. * * * It is the purpose of the State to prevent persons who do not possess the necessary qualifications from inflicting injury upon the citizens by undertaking to treat diseases, wounds and injuries." From these statements it is evident that the State requires that practitioners of medicine and surgery shall be educationally qualified for such work. What other means than drugs and surgical appliances physicians may deem necessary, is of no concern to the State. Men may seek aid from Heaven in whatever way God may be pleased to give it—that concerns not the State.

But "Christian Science" claims and pretends to a method of treating disease which neither God nor the State has ever recognized; and for this reason, and this alone, the State should not recognize "Christian Science" in any way except by positively prohibiting it from the sick room. The State deals with things tangible, material and real; yet "Christian Science" pronounces all such things myths, errors, or dreams or imaginings. The State, therefore, cannot stultify itself and outrage common sense by recognizing "Christian Science" as a method of healing, and as taking charge of the sick and treating disease or an injury by silently and mentally arguing against the fact of disease. The sacredness of life is too great and the health of citizens too important to allow either to be jeopardized by transient schemes being placed on an equal footing with that which the experience and wisdom of centuries has sanctioned.

It is not claimed by rational medicine that remedial measures or surgical operations can cure in the sense that a basic substance removes the acidity of an acid. The surgeon removes a diseased part that would cause death if allowed to remain, or to await the chances of silent, mental arguing against the fact of disease. The physician's drugs but aid the *vis medicatrix naturae*, which is the real force which cures disease; and a lengthened experience shows that this result does not always follow the use of such means. Nevertheless, their aid is none the less important and necessary. Divine and human wisdom have sanctioned the necessity and use of remedial measures, and declared the reality and seriousness of disease; and it is too late in the day for the world to go back on the conviction of centuries and take up transient fads.

The disappearance of disease without the use of medicine is not a mystery when we know the conservative and curative powers of the vital force; but the non-use of them is not justified on any ground when they are accessible. Even a claimed cure on the "Christian Science" method is not unconditional. The mind of the sick party must be argued out of the notion that he is sick or injured. And what if the argument does not succeed? The most gullible disciple or C. S. D. does not claim that success is universal. If the failure arise when drugs are used the party is said to die, but as the body of the patient is but an illusion and the mind immortal, because it is God, "the science" says there is no such a thing as death.

How is the arguing to take effect in unconscious apoplexy or compression of the brain by any cause? And what of its power on the mind of a child not yet capable of reasoning? In either case the patient does not hear the argumentative pleading and how is either to be cured? By arguing with the parent when the patient is a child of irresponsible age? Children have died under "Christian Science" from the criminal neglect of giving it a reasonable chance of recovery. The law does not suffer a parent to allow a child to die from starvation when he is able to procure food. The child cannot do that for itself; nor can it choose a physician when sick. This is the duty of the parent; and if the child dies through his neglect, or because he is a "Christian Scientist," and, therefore, does not believe in either sickness or death, the fit remedy for such a parent is the electrocution chair. If a child should fall into a body of water capable of drowning him and the parent make no attempt to get him out because, as a "Christian Scientist," he does not believe that there is such a thing as

water, nor in its ability to destroy life, every gamin on the street would cry, brute; and then apologize to the brute for his disrespect. He ought to, surely, for animals have been known to aid each other in danger. While the "cult" has nothing in it to commend it to enlightened minds and normal consciences; while it resembles more an effort of benighted paganism to attain the impossible outside revelation; and while it has in it nothing that is either scientific or religious, or even entertaining in a leisure hour, yet there are among its devotees many who exemplify a kind and gentle disposition very commendable; who seem impressed with the reality of what they believe (though everything but mind—God is unreal) and manifest a fraternity of feeling worthy of more rational brotherhood; yet the soul of the "cult" lacks the inspiration of that source whence flow sentiments which have the quality of imperishable merit. That incomparable eulogy on love by the apostle to the gentiles had in view only that love that is inspired by the Kenosis of the Logos—the only love of enduring value, and the only one that will avail mankind in the most critical moment of human existence. The devotees of the "cult" may traverse seas and lands to make proselytes; they may erect temples rivaling those of paganism, and exhibit a zeal and devotion excelled only by that of pagans and Christian martyrs, yet the "cult" is none the less the most shadowy of all shadows—a melancholy example of what the human mind may be led into by the siren song of unseen influences of a malign character.

INSPECTION OF PETROLEUM PRODUCTS.

Section 2508 has been a source of a great deal of confusion and needless contention. There have been efforts in various parts of the State to introduce various devices for using gasoline and the lighter vapors of petroleum for illuminating purposes.

It was generally believed that lines 20, 21, 22, 23, 24 and 25, to include the word "lamps," granted the privilege of using, under the conditions specified, gasoline as an illuminant. It was believed by the Board that such use was a menace to the public health, and the opinion of the Attorney-General was sought. His decision is submitted herewith.

The section is contradictory, disjointed and misleading and should be so amended as at least to be less ambiguous.

DES MOINES, Iowa, November 30, 1898.

Hon. Leslie M. Shaw, Governor of Iowa:

DEAR SIR—Your favor of the 16th inst. duly received, in which you say:

There are being sold within the State of Iowa certain gasoline lamps with reservoir attachments directly or nearly over the burner. These lamps and reservoir attachments are, of course, portable. Is the sale of these lamps and their use permissible under the statute?

Section 2508 is a long and cumbersome section, consisting of one sentence of forty-two lines in the code, and it is by no means easy to determine exactly what is meant by some of the provisions. Let me say, first, that there is no provision of the law preventing the sale of any kinds of lamps

in the State, or the use of any particular kinds of lamps as such. The inhibition of the law relates to the use of all products of petroleum of certain kinds.

Among other things, the said section, as amended by chapter 62, laws of the Twenty-seventh General Assembly, provides: "If any person * * * shall sell or offer to sell, or use any product of petroleum for illuminating purposes which will emit a combustible vapor at a temperature of less than 105° standard Fahrenheit thermometer, closed test, except as otherwise provided in this section, for illuminating railway cars, boats and public conveyances, and except the gas or vapor thereof shall be generated in closed reservoirs outside the building to be lighted thereby, and except the lighter products of petroleum when used in the Welsbach hydro-carbon incandescent lamp, and for street light by street lamps, shall be fined not less than \$10 nor more than \$50."

The general law stated is that the use of any product of petroleum of the prohibited kind is unlawful. What are the exceptions? First, except as otherwise provided in this section for illuminating railway cars, boats and public conveyances; second, except that the gas or vapor thereof shall be generated in closed reservoirs outside the building to be lighted thereby; the third exception being all lighter products of petroleum when used in the Welsbach hydro-carbon incandescent lamp; and fourth, for street light by street lamps.

While the meaning is not altogether plain, I think the exceptions above given are a fair statement of the legislative intent. We have, then, a general law forbidding the use of the lighter products of petroleum, to which there is an exception that such lighter products may be used when used in a Welsbach hydro-carbon incandescent lamp.

Your inquiry does not state whether the gasoline lamps which are being sold are the Welsbach hydro-carbon incandescent lamps, or not. If they are not, it follows that the use of gasoline in the lamps which you refer to is not excepted from the general law forbidding the use of the lighter products of petroleum for illuminating purposes; hence, the use of the lighter products of petroleum, among which is gasoline, in the lamps referred to, is prohibited by law.

If, however, your inquiry relates to the Welsbach hydro-carbon incandescent lamp, a very different question is presented. Assume that my statement of the exceptions to the general law prohibiting the use of the products of petroleum for illuminating purposes, which will emit a combustible vapor at a temperature of less than 105 degrees standard Fahrenheit thermometer, closed test, to be correct; then it is evident that the legislature intended to permit the use of the lighter products which would not stand the test above stated, in Welsbach hydro-carbon incandescent lamps, and to prohibit the use of all other kinds of lamps.

The effect of this is to give the manufacturer of the Welsbach hydro-carbon incandescent lamps a monopoly on furnishing the lamps in the State of Iowa for the use of the lighter products of petroleum. If the giving of such a monopoly had been incorporated in a statute by itself, I do not think any lawyer would doubt that it was obnoxious to section 6, article 1, of the constitution, which provides: "The General Assembly shall not grant to

any citizen or class of citizens privileges or immunities which upon the same terms, shall not apply equally to all citizens."

How different is the case when the special privileges are granted by indirection by an exception to the general law? I do not think there is any difference. This, to my mind, is as plain an infraction of the constitution as if the legislature had by law provided that no kinds of lamps for the use of gasoline for illuminating purposes should be used in the State of Iowa other than the Welsbach hydro-carbon incandescent lamps. In view of the fact that there are other lamps which are claimed to be equally as safe as the lamp named by the statute, there is a determination by the statute that no such lamp can be used. While the law does not, in direct terms, prohibit the sale of lamps of any kind, yet it prohibits the use of the lighter products of petroleum except in lamps of the specified kind.

There is no ground in public policy for holding that gasoline shall not be used in a lamp equally as safe as the Welsbach hydro-carbon incandescent lamp, and the palpable effect is to give the manufacturers of the Welsbach lamp a monopoly of the sale of lamps for burning gasoline in the State of Iowa. This cannot, in my judgment, be upheld.

Believing that that part of section 2508 embraced in the following clause: "and except the lighter products of petroleum when used in a Welsbach hydro-carbon incandescent lamp," to be unconstitutional, the question arises; what is the effect of this upon the entire section. The rule of law governing such a case has been well stated as follows: "The fact that part of a statute is unconstitutional, does not authorize the court to adjudge the remainder void unless the provisions are so interdependent that one cannot operate without the other, or so related in substance as to preclude the supposition that the legislature would have passed one without the other. The question is not whether valid and invalid portions are closely related in a particular clause or section, but whether they are essentially and inseparably connected in substance."

This rule has received the sanction of many judicial decisions of the courts of nearly all the states, including our own. Section 2508, without the exception referred to, was enacted in 1884. The exception was inserted for the first time by the extra session of the Twenty-sixth General Assembly, when the code was enacted. The valid and invalid portions of the section are not interdependent the one upon the other. The valid portion can operate without the other, and did for many years. The history of the legislation precludes any supposition that the legislature would not have enacted the valid portion without the invalid, and, in my opinion, the remainder of the section is unaffected by the view that the clause above quoted is unconstitutional.

I have been reluctant to adopt the views herein expressed, and hesitate to express the view that any act of the legislature is unconstitutional, but having given the matter careful thought, and having examined the decisions of different courts bearing upon the subject, I cannot get the consent of my judgment to express any other conclusion.

It is my opinion that the use of gasoline, or any other lighter products of petroleum, in the State of Iowa for illuminating purposes in the lamps inquired about, is prohibited by law.

Yours truly,

MILTON REMLEY,
Attorney-General.

THE SALE OF LINSEED OR FLAXSEED OIL.

Chapter 52, acts of the Twenty-seventh General Assembly, in sections 4 and 5 are contradictory and confusing.

Section 4 says: "It shall be the duty of *inspectors of petroleum*, under such rules and regulations as the State Board of Health may prescribe, to enforce the provisions of this act."

Section 5 says: "It shall be the duty of the county attorney, upon the application of the State Board of Health, to attend to the prosecution in the name of the State, of any suit brought for violation of any of the provisions of this act within his county."

Section 4 would indicate that the oil inspectors, fourteen in number and operating in every county in the State, were the parties to bring suit, through the county attorneys. On the other hand section 5 specifies the Board of Health.

It would be better for the Board of Health, through the inspectors, to collect and test the samples, and upon finding of adulterated samples, notify the inspector furnishing the sample, and he should be required by act to institute through the county attorney legal proceedings, and not the State Board of Health.

It is feared the law as now enacted will not have the desired results. There is abundant evidence that the State is being flooded with adulterated linseed oils that are sold to purchasers who think they are buying pure linseed oil. These goods are sold as "paint oil," "pure kettle-boiled oil," "special kettle-boiled oil," etc. It will be noticed that the word "linseed" or "flaxseed" does not appear on the brand and the dealer cannot be held as violating the law.

Yet in nearly all such cases the purchaser thinks he is buying pure *linseed* oil and is disappointed at the results. Some modification of the law, if possible, should be made whereby such fraudulent sales and such disappointments could be prevented.

XIV.

SANITARY BACTERIOLOGY.*

The study of Bacteriology is productive of more good in sanitary than in medical science. Following the discovery of various diseases producing bacteria comes diminished death rate from these diseases. This diminished death rate is due only to a very limited extent to improved medical treatment, while improved sanitation—the science of preventing disease—saves its countless thousands.

TUBERCULOSIS.

The greatest problem in state medicine is that presented by tuberculosis. The contagious nature of this disease is now better understood than ever before, and the necessity for disinfection is now generally recognized by the public. Before a statutory law can be of practical use the public must be educated to appreciate the conditions that call for the enactment of such a law. Hitherto the attempt to enact, or to enforce when enacted any law relating to tuberculosis has met not only no support, but active antagonism. But, at present, a large proportion of the reading public are anxious to have enacted laws that will protect them from needless exposure to this dread disease.

Isolation.—What can be accomplished toward diminishing the prevalence of this disease by isolation, and is isolation feasible under the present social conditions? These are questions which are becoming the subjects of legislation, and are questions upon which our sanitarians are not a unit.

If all individuals known to be tubercular were isolated, hundreds of cases not recognized as such, by themselves or physicians, would still go about infecting their fellows, unmolested and unknown. At present but few cases are recognized until they have gone about for months, and even

*By Eli Grimes, M. D., Bacteriologist of the Board, Des Moines.

years, expectorating bacilli in untold millions, and not until the stage of active decline is reached is it found that they are tubercular. To take the individual at this late stage and isolate him would be a hardship to both himself and society, and hardly justifiable while there are so many other sources of contagion to which the susceptible are being constantly exposed. It therefore follows that before isolation can be of practical benefit we must have a more universal means of detecting the disease. Certain restrictions, however, should be placed upon every tubercular individual. Rigid sanitation in the home promises the greatest results, for here it is the relatives of the stricken individual come in contact with the contagion, and these relatives are, from the very nature of the disease, predisposed as was the now tubercular individual. Rigid domestic sanitation, the intelligent use of anti-tubercular measures, and personal hygiene will prevent contagion and save the health and lives of the other members of the family. These measures should be under the direct supervision of a trained health officer. Every city, town and township should provide such an office, with a liberal compensation. With such a regime in vogue the cases of tuberculosis contracted at home, and erroneously called inherited, would be greatly diminished, and ultimately become unknown. We must have a crusade against tuberculosis and that crusade must begin at the right place—the home of the disease.

Milk.—That milk is a conveyor of tuberculosis bacilli has been proven, experimentally, by a host of investigators. Just to what extent tuberculosis is developed in a cow before the milk becomes infected is a mooted question, but the milk, in the case of udder tuberculosis, contains bacilli, and it has been demonstrated, over and over again, that such milk will produce, in the lower animals, tuberculosis. Strict inspection of dairies should be enforced, or, in the absence of such inspection, the milk should be boiled.

Sunshine.—It has recently been shown that the bacillus of tuberculosis is not killed as quickly by sunshine and light as has been hitherto taught. Sanitarians and physicians in general have attached too much importance to the destructive action of sunshine on the tubercular bacilli in expectorate. Tubercular sputum, although exposed to direct sunshine for thirty-five hours, has been found to be virulent. In these tests the sputum was exposed under the same conditions that exist when expec-

torated on the streets or elsewhere, and after thirty-five hours' sunshine, the time not exposed to direct sunlight not considered, the sputum has been found to still contain living bacilli of tuberculosis. (W. C. Mitchell, M. D., and H. C. Crouch, M. D., Denver, 1899.) This is, without doubt, the most important observation from a sanitarian's standpoint, that has recently been made concerning tuberculosis.

TYPHOID FEVER.

That typhoid fever is a disease of non-hygienic surroundings has been recently demonstrated on a large scale. It is hoped the lessons so dearly bought will be well learned, and hence assist in the improvement of all those conditions of water, food, sewage disposal, etc., that are factors in the perpetuation and spread of this disease. The most important fact recently discovered is the persistence of the bacilli in the urine for a long time after apparent recovery. In about 25 per cent of typhoid fever cases the bacilli appear in the urine, and in a high percentage of these cases they persist long after apparent recovery, in some cases months, and even years. The proper disposal of the urine in cases recovering from typhoid fever is of great importance. That this is neglected in most cases is evident to every observer, yet its importance can not be over-estimated.

CEREBRO-SPINAL MENINGITIS.

That the *diplococcus intracellularis* of Wiechselbaum is the causative agent of cerebro-spinal fever is now well established, hence the conditions that favor the contagion and propagation of this disease are to become better known, with a consequent lessening of deaths, owing to better preventive measures.

MALARIA.

This disease, with all its varied manifestations, is the result of an infection of the blood with a specific organism (animal). It has been proven that the mosquito is the carrier of this infection, and the bite of certain species of this insect inoculates its victim with the malarial poison. The fact that where there are no mosquitoes there is no malaria has long been observed, but with the supposition that the conditions which favor the production and multiplication of mosquitoes develop malaria also; but it has recently been proven beyond a reasonable doubt that it is the mosquito which transmits to man the malarial infection. It is believed that a practical method of exterminating the

mosquito pest can be found and ultimately the extinction of malarial diseases. More practical work along this line is greatly needed.

SCARLET FEVER, MEASLES AND SMALLPOX.

The exact causes of these diseases still remain unknown. That they are of bacterial origin is only inferred from their nature. The State's recent experience with smallpox demonstrates the efficiency of quarantine and disinfection. If every disease was fought on the same lines, and fought as actively, they could likewise be controlled. It is hoped the lessons learned in overcoming, or preventing the smallpox epidemic will be applied to other diseases which are now too laxly handled. The most reliable preventive agent, however, is vaccination—the only measure adopted by physicians and nurses who are brought in most intimate contact with the disease. All other means of prevention could more readily be dispensed with than vaccination.

THE SPREAD OF CONTAGION.

Besides actual contact with the sick, there are various means by which disease producing germs are carried from man to man. If all the agencies active in carrying these bacteria were thoroughly understood we would be masters of the infectious diseases and the same would soon be exterminated; but at present our knowledge is very incomplete, yet we believe we have discovered the principal factors of infection and our next step is to control these factors.

Dust.—Study the source of dust in any public place and its dangers will be appreciated at once. The expectorated matter on the floor will become dry and beaten into dust. The feet of a hundred pedestrians each adding its mite to the possibilities of the place; the wearing apparel coming from all sorts and conditions of homes, brought into actual contact with each other in the merging crowd. The process of sweeping and dusting carried on in the most careless manner, usually consists in getting the greatest possible amount of dust off the floor and furniture into the air. It is especially in school buildings the dust is of the greatest possible danger, and it is recommended that this phase of school sanitation shall receive more attention.

Water.—It must be remembered that as the country grows older the dangers from water increase. This is especially true of well water in country places. From year to year the soil becomes more and more impregnated with filth. The majority of country places have no adequate means of disposing of sewage, or any filth, and it is all claimed at once by mother earth with the result that every year brings a more and more impure condition of the water. The location of every well and the nature of the water should be passed on by competent authorities before the water should be used.

Sewage.—One of the most glaring evils, from a sanitarian's point of view, is the utter lack of adequate means of disposing of sewage through the country and small towns. It is noticed that the decorative arts in building and gardening are receiving a great deal of attention throughout the State. People take commendable pride in such matters. Our homes throughout Iowa, with beautiful lawns and trees and foliage plants, are worthy of the admiration they receive; but there still remains undone the most essential part of home-building, that is, the proper disposition of sewage and all waste, and the provision of a pure water supply. These should be the first considerations in locating and building a residence.

Domestic Animals.—The domestic animals, including the household pets, the cat and dog, are often carriers of contagion. It must be remembered that these animals are subject to many of our contagious diseases, and under such conditions are as great a danger to the community as a human subject with the same diseases. Pet animals should not be allowed in homes where contagious diseases exist, as they carry the germs in their fur as well as contract the disease. This fact is apt to be disregarded, especially in families of tuberculous individuals.

Insects.—Mosquitoes have been mentioned under malaria. That flies are an important factor in spreading contagion is very probable. Study the habits of these insects in a room where a typhoid fever patient lies, and it is evident that many cases of this disease are due to the fly pest.

XV.**DISINFECTION.*****TESTS OF METHODS USED THROUGHOUT THE STATE.**

In November, 1898, the following proposition was made:

To Local Boards of Health, Health Officers and Physicians:

In order to determine whether the methods and processes of disinfection used in your locality give the results expected and desired or not, a special investigation with your co-operation will be undertaken.

Public safety demands that disinfection be thoroughly done, yet as carried out in this State we have no positive evidence that effectual measures are used. On the contrary, the frequent occurrence of so-called sporadic cases of diphtheria, scarlet fever and other contagious diseases certainly shows that disinfection is far from perfect. It is hoped that health officers, physicians and others will co-operate in this investigation. Test objects will be supplied gratis to anyone applying for determining the efficiency of the disinfection. These test objects are preparations of harmless bacteria which have about the same resistance as the disease-producing bacteria. These are to be exposed in the rooms being disinfected, and then returned to me for examination. Full directions will be supplied with each set of tests. There are no fees connected with the investigation, and it is hoped that all who have disinfection done will use these tests. Requests for these test objects should be sent direct to me.

ELI GRIMES, M. D.,

Bacteriologist to the State Board of Health, Des Moines, Iowa.

With each set of objects a card of instruction and data blank as follows was sent:

CARD OF INSTRUCTIONS.**TEST OF HOUSE DISINFECTION.**

The cloth test objects are not to be unfolded.

Place these test objects in various parts of the house or rooms, just before disinfecting, and allow them to remain exposed until the process of disinfection is complete; then replace them in the envelope.

Fill out enclosed blank and return to this department.

*By Eli Grimes, M. D., Bacteriologist of the Board, Des Moines.

DATA BLANK.

TEST OF HOUSE DISINFECTION.

Date.....

Name and address of Health Officer or Physician conducting the disinfection:

Location of premises.....

For what disease.....

Number of rooms..... Cubic feet of space.....

What disinfectant used

How much used..... Time rooms remained closed.....

What special method, if any was used.....

In case formaldehyde was used, state how it was generated.....

While the number of tests was not as great as we hoped to make, yet sufficient work was done to establish some valuable facts. That disinfection, as ordinarily conducted, is rarely efficient was proven by the great percentage of tests that were returned with the bacteria still alive. The bacteria were in a condition to be readily acted upon by the disinfectant, the time of exposure, and their age were favorable for their destruction. Out of seventy-three tests sixty-eight showed that the disinfectant was not active. The test objects were often returned with the statement that "rigid," "active" or "most exact" disinfecting measures had been used, but when the objects were examined they failed to show the effect of any disinfectant. The reason for such a great number of failures may be briefly summarized:

First, not enough disinfectant was used; second, the rooms were not tightly closed; third, the rooms were opened and aired too soon after being disinfected.

The gaseous disinfectants used were formaldehyde and sulphur fumes. The infected houses were of all kinds and conditions. The principal cause of failure was that not enough disinfectant was used. Considering the importance attributed

to disinfection, the table here presented is certainly a remarkable one:

Sulphur was used forty-six times; failed forty-six times.

Formaldehyde gas was used twenty-seven times; failed twenty-two times; disinfected five times.

In no case did sulphur fumes disinfect.

In no case did wood alcohol formaldehyde generators disinfect.

In no case did less than eight ounces of 40 per cent formaldehyde to the thousand cubic feet of room space disinfect.

The rules for gaseous disinfection of rooms given in this report are based on this series of tests, together with tests made in Des Moines, in private residences, hospitals, school buildings, and laboratories. It is hoped that these rules will be valuable at least in one particular, that is, in showing that disinfection is a difficult thing to accomplish.

When to disinfect.—During the course or at the termination of every infectious contagious disease, thorough disinfection should be practiced. The diseases requiring disinfection encountered in this State are diphtheria, membranous croup, cerebro spinal meningitis, smallpox, scarlet fever, typhoid fever, tuberculosis or consumption, erysipelas, whooping cough and puerperal fever.

During the course of the disease the disinfection will necessarily be confined to those articles and materials that are removed from the room. At the termination of the disease, either in death or recovery, the room and contents are to be thoroughly disinfected.

Disinfection of clothing and every article that can be subjected to the action of water will be thoroughly done by immersing for two hours in a 2 per cent solution of formaldehyde. This solution is made by adding the commercial 40 per cent solution to water in the proportion of 1 to 19. This is an inexpensive, efficient disinfectant, much to be preferred to corrosive sublimate or carbolic acid. Corrosive sublimate injures most fabrics and colors, acts upon metals, and is very poisonous. Carbolic acid is caustic if used in sufficient strength to do good. The old 2 per cent solution of carbolic acid so long recommended as a spray and as a disinfectant for bedding and other clothing is of little or no value. If carbolic acid is used, less than the 5 per cent should not be employed. The mild, disinfective properties are associated with so many disagreeable

features that formaldehyde can take its place very advantageously. Sputum, urine and fecal matter should have added to them about an equal amount of this 2 per cent solution and allowed to stand twenty-four hours before being disposed of. Spittoons, urinals, bed pans, etc., should at all times contain a quantity of this solution. Carpets, rugs, etc., can be disinfected by thoroughly spraying with the 2 per cent solution of formaldehyde, wrapping or rolling tightly together and allowing to remain so packed for twenty-four hours. This is found efficient in most cases, but immersion in this solution should be practiced whenever possible. In spraying carpets, rugs and other articles needing disinfection at least one ounce of the solution should be used for every square yard of the fabric so treated.

At the termination of the disease.—It is not necessary to disinfect the room and all its contents. Formaldehyde gas is to be used in preference to any other gaseous disinfectant. In order to obtain desired results the following directions must be closely observed and practiced:

(1) All cracks or openings in the plaster or in the floor or about the door and windows should be calked tight with cotton or with strips of cloth. It must be kept in mind that rooms finished in ordinary rough plaster without kalsomine or whitewash cannot be tightly closed. The porous plaster admits the escape of gases so that disinfection by this means has been found to be practically impossible. Rooms and walls which are so finished must be thoroughly whitewashed or kalsomined repeatedly and allowed to dry before disinfection can be accomplished. Another source of failure are the crevices in the floor. These should be carefully closed.

(2) The linen, quilts, blankets, carpets, etc., should be stretched out on a line in order to expose as much surface to the disinfectant as possible. They should not be thrown into a heap. Books should be suspended by their covers so that the pages are all open and freely exposed. Books that have been used by the sick cannot be disinfected. They should be burned. Books, however, that have remained on shelves or in book case in the room need not be interfered with, and can be separately disinfected by exposing the covers, as the infectious material is only on the surface. The linens, quilts, blankets, carpets, etc., all should be disinfected as before directed.

(3) The walls and floor of the room and the articles contained in it should be thoroughly sprayed with water. If masses of matter or sputum are dried down on the floor they should be soaked with water and loosened. No vessel of water should, however, be allowed to remain in the room. In spraying the walls, furniture, etc., with water too much should not be used, as too great an amount of water inhibits the action of the disinfectant. Masses of matter, sputum, and other infectious material should be soaked with the 2 per cent solution, as it is much more efficacious than the penetration of gas after it is wet with water.

(4) Eight ounces (240 C. C.) of the commercial 40 per cent formaldehyde solution for each 1,000 cubic feet of space to be disinfected, should be used. This solution should be rapidly vaporized, or distilled into the room. The principal causes of failure in disinfection come from using too small an amount of the disinfectant. The formaldehyde should be procured from a reliable house, and the means of distilling and vaporizing into the room should be thoroughly done in order to insure the disinfection.

(5) The room thus treated should remain closed for ten hours. This period, while long enough in most cases, yet wherever it is practicable twenty-four hours should be allowed to elapse before the rooms are opened and aired.

(6) The apparatus used for carrying out these instructions must be approved by the State Board of Health, upon the recommendation of its bacteriologist. It will be noticed by reference to the table of disinfectants that in no case did the disinfectant lamps or other wood alcohol apparatus disinfect, hence rule 7.

(7) The so-called "disinfectant" lamps and other apparatus that use wood alcohol for generating formaldehyde are condemned as worthless, and their use cannot be considered as disinfectant.

XVI.

"PUBLIC PARKS FOR IOWA TOWNS."*

MR. PRESIDENT—The theme before us is one of more than passing interest. It stands for a movement that has come suddenly, it is true, upon the attention of our people, but has come in such a way as to meet immediate approval. Public parks are matters of public concern and their establishment will be popular at the outset and, if wisely and honestly managed, popular forever afterwards. The day is coming when public parks will rank with public schools, lacking only in communities the most benighted.

That we have not earlier given heed to this matter need surprise no one familiar with our history. Public parks are among the maturer fruits of our civilization both in their nature and in the necessity which they are called upon to meet. They indicate a stable, more or less crowded population on the one hand, and on the other a stage of social development in which the æsthetic side of man's nature is beginning to make itself manifest both for the individual and the community. That there has suddenly, therefore, sprung up among us a demand for public improvement of the sort mentioned means simply that as individuals and as societies we are hurrying on to those more or less crystalline conditions into which civilized humanity under normal development must inevitably come. Thirty years ago, twenty years ago, no one thought seriously of parks for the State of Iowa. True, following the illustrious example of William Penn, we laid out our towns in rectangular primitive severity, and rather prided ourselves that we had no crooked streets like New York or cow-paths like Boston. We followed the old Quaker, too, in reserving here and there a square for public purposes, sometimes one in the center of town, sometimes two or three, and these at that time satisfied all demands for commons, public grounds, or parks, and as for beauty—such a thing never entered our heads. The whole State was a park, the fairest on the planet; all any one had to do was to look around. It was not a question of parks, it was a question of homes and cities; not how many squares we should leave vacant, but how many would ever be filled up.

Not only is this true, but over the whole United States the idea of parks is not much in advance of us. Up to 1854 Boston common was the only park of any size in connection with our largest cities. In that year New York was induced to buy the land that has since become Central park, and there are plenty of men now living who out of their own experience can tell you

*Paper read before the First Annual Convention of the League of Iowa Municipalities, Marshalltown, Iowa, October 12-13, 1898, by Thomas H. McBride, A. M., Ph. D. Professor of Botany, State University of Iowa.

how Central park came to be what it is. Fairmount park was purchased to protect the intake of the city water supply of the city of Philadelphia, and it was not until about 1876 that any one dreamed of making of that bit of country and the vale of the Wissahickon the beautiful, the surpassingly beautiful, resort for millions it has since become. Cleveland has only recently gathered about herself that magnificent stretch of garden and woodland from lake shore to lake shore around the city, which when perfected as planned will distance everything of the kind ever attempted on this continent or anywhere else. And Boston, the professed center of culture and political wisdom, has only since 1892 brought under control of its park commissioners that wonderful domain which practically includes every brook and spring, every green tree, in a circle whose radius is twelve miles, whose center is the State House.

So then our effort here in Iowa to discuss the question of public parks is exactly timely, is by no means belated. Although of the newest of commonwealths, we are marvelously soon at maturity and are about to show the world in fifty years what has elsewhere waited for slow moving centuries. Until yesterday Iowa did not need public parks, but now, as I shall show you, the necessity is upon her and we are going to lead the world in the rapidity with which we are about to meet our changed conditions.

Who among the older residents of the State does not remember the condition of affairs in Iowa say twenty years ago? Prairie land was cheap; the rivers and streams were bordered by timber; native groves covered the hill tops here and there, and in a thousand places the primeval white oaks shaded the forest spring first named by the pioneer. Everything was open. The woods, the groves, the rivers, the springs belonged to the public. Nature in her most beautiful phases was free to the poorest comer. The farmer hitched up his farm team and took his family for recreation to the "springs." There he met the townsman, come forth on a similar errand. Your Sunday school picnic was a day of unqualified delight under the trees of God's own planting, and even the solemn service of the sanctuary might be chanted under the arches of "God's first temples."

I believe you will bear me out in the statement that up to about twenty years ago, or less, the whole wooded or rocky portion of Iowa was a public park, a flower garden, a plum orchard, a game preserve for the people of this State. This is fact number one. Here is the second: Since 1878-80 all this has been changed. Almost every acre of land has been put under fence and hardly an acre remains in eastern Iowa, at least, exempt from private use. The reasons are manifold. The invention of barbed wire, a cheap fencing material, the rise in the value of pine lumber, calling down our oaks, the return tide of the migration to the Dakotas and the consequent demand for land, all these have conspired to the same end so that our people find themselves, all at once, entirely deprived of everything that has until this day stood to them in the stead of parks. The third fact follows: The people are just as much in need of parks as ever they were, and they must have them. Nay, the need widens, deepens, becomes more vociferous every hour. You observe I say the people. I mean the people. I mean those who Abraham Lincoln called the "plain people." Not the learned, they have their resources; not the rich; they may go to the ends of the earth in search of beauty, of mental refreshment; but the everyday

people who toll fifty-two weeks in the year, on the farm, on the street, in shop and mart; the people who rear the children of the republic, earn its wealth, cast the ballot of its destiny and, when need is, fill its armies and fight its battles; for the common people is our concern; their cause we must espouse, if they are to remain sane, happy, and contented.

There is truth in the ancient fable of the giant, invincible so long as he could touch the earth. Every time he touched the ground his strength revived. And so in the opinion of all who reflect upon the problems of human living, no people can maintain its virility, propelling force, that does not come somewhere close to the natural world. The peoples who hold to-day the destinies of humanity in hand swarmed out of the Teutonic forests of old Germany, the highlands of England and Scotland. They came not from the artificial conditions of perpetual bondage to street and toil. Now, I insist that the people of Iowa have already, such is the rapidity of our march, come to that point where public parks are a necessity to the public health, not in our smaller cities only, but everywhere over the entire State.

But you say, perhaps, it is time you should define more particularly what you mean by a public park; this I have already done by reference to earlier conditions in Iowa. By public park I mean a place of public resort, showing to the largest degree possible purest natural beauty, large enough to accommodate the people where each may seek his pleasure all apart from others, a region so arranged and so controlled as to offer absolute retreat from all that wearies or worries the sons and daughters of toil. My park should be big enough to instruct, but especially to please and soothe. It should exhibit the greatest amount of variety the region will afford. It must present a landscape, or many of them. It must be the pride of the community, the solace of the weary, the delight of all; perfectly governed, but accessible to everybody during the hours of daylight every day and every hour. At the same time it must constitute a part of the educational forces of the community; it must teach the right use of nature, the gospel of order and law.

So much for what is needed; now how shall such a park be secured and controlled? In the first place we may take courage in the thought that as far as form is concerned, the park is very largely in most regions the work of nature. Let the earth alone, and all bountiful nature will speedily cover it with glory. This she had done for Iowa before the advent of the plough and ax. Who that has seen them in their pristine beauty can ever forget the far-stretching emerald prairie-meadows with their untold floral splendor, redolent yet in memory of the summers of long ago? Who can forget the white oak or bur oak openings where the clean white-shafted trees were marshaled in open order in Iowa's upland groves? Who does not remember the darker woods along the streams then clear-flowing and perennial, the plum thickets whose sweet odors streamed out on every breeze of spring, the crab orchards with their banks of glorious bloom covering the whole hill-side with their wealth? Who that has seen these things can ever forget them or for a moment doubt what nature can do for us if we but give her a chance? All we need to do is to use what nature has placed in our hands, to see to it that her work is not destroyed, and we shall have for our whole people just the kind of resort that the times demand. It is remarkable in how many places the foundation for our work is still ready to our

hands. Our towns are by the rivers, and the rivers are even yet fringed with woods. We have cut away the old trees, but the second growth has been quietly coming on during thirty or forty years and affords now in the neighborhood of nearly every town, one of the essentials of a park, shade and cover. Along every stream there is opportunity for a road, above every stream rise wooded banks, often rocky and steep, from which may be obtained fine vistas of the surrounding landscape. Nearly everywhere tributary streams have cut narrow gorges down to the river's edge, by nearly every town is a mill-dam with its lake of back-water behind. All these are the primary component-elements which go to make up a park. Near Iowa City we have to-day one of the finest opportunities to secure for ourselves and for generations to come a magnificent heritage, and I am glad to say that we are making a beginning.

Mr. Regan's park is a private enterprise, but it is a beginning; to his courage and appreciation of public need we owe an object lesson in park building, which has aroused, as nothing else could have done, the sluggishness of our people. As a result Iowa City, using the resources at hand, will, we believe, soon show a system of parks worth going far to see. We have the opportunity, and public sentiment is at last awake.

What parks may we not have along the Mississippi river at Dubuque, Clinton, Davenport, Muscatine, Burlington. The views from the bluffs of those cities are, in their kind, unexcelled in the world. Nor are interior smaller towns, in their own way, less fortunate. Humboldt, for example, is shut in on west and northwest by a wall of green, all summer long—a grove of nature's planting. Under the shadows of the grove murmur the clear waters of the West Des Moines. Once that grove is destroyed the beauty of Humboldt as a home for its people is gone. We are making a beginning when we realize the possibilities of the case, when we appreciate the situation.

But a more pertinent and practical question, at this point, now confronts us. Conceding all that has been said, that the people need public parks, that the need is pressing, that their equivalent is no longer supplied, and that we have the materials about us for meeting the need, it still remains to be shown how the occasion may be most efficiently improved—the situation met. In the first place we must have change of ownership in the territories we propose to use. If the public use property, the public must own the property. This is implied in the very first idea of a park. Across the ocean kings and princes own the parks and gardens. In republics the people succeed to the throne, and it is right that people own the royal estate, the king's realty. Had our Iowa people, fifty years ago, foreseen what fifty years should bring about, our problem had been solved. Large areas in the neighborhood of every town had been reserved for public use, and means had been taken to preserve the king's property until the king should come of age—should arrive at years of discretion, as at this hour. But it passed the knowledge and experience of man to foresee. Who would have dreamed, fifty years ago, that such a city as lies about us should be here to-day, in beauty, by the river?

There are now two ways in which the king's portion may be made good to him. The first is by out-and-out purchase. The city may buy its parks. This is the plan hitherto of many of the large cities of the country. Cen-

tral Park, New York, cost originally between five and six millions of dollars. Chicago bought certain of her most beautiful reserves at great price, and so with other cities. Fortunately for Iowa towns no such vast sums are needed to re-establish the prince—to give the king his own. The lands we would use are the cheapest of the cheap. Except that they are contiguous to the town they are almost valueless. They are the steep bluffs, the rocks, the deep ravines, the river-banks. The picturesque cannot be farmed. To begin with, let the town buy a limited amount of such lands and commence their improvement. The function of the city at the outset will be the building of paths and roads, the control of waters and the protection which public property everywhere demands. Nature will take care of the rest. Your wild lands will grow into beauty with a rapidity that will surprise the most enthusiastic. The direction in which the improvements in the park shall go forward should be determined by the highest wisdom of the community. You must have a park commissioner; his position should be wholly honorary; he should serve without pay. We are busy people here in the west, but I am confident that there is to be found in every town in Iowa a man sufficiently patriotic and wise to serve the community gratis, year in and year out, in capacity of park commissioner. He must have absolute control. Politics may come and politics may go, but your commissioner must go on forever; the servant of no party, dependent on none, the honored servant of the whole people. Find such a man as that, give him a few acres of brush-land and means to do a little solid work each year, and in ten years the people will rise up to call him blessed and the public park will be the pride of the town.

This is the beginning. As the years go by, additional lands may be acquired. One thing will lead to another. Your park commissioner will make wise suggestions. Strangest of all, presently the city will not need to buy lands. The value of such public property will become so evident that on every hand men will come forward bearing gifts. "To him that hath shall be given." In and about every town are men of larger means who often devote days to the consideration of how they may dispose of their accumulations to the good of their fellow men. As America has afforded unexampled opportunities for wealth getting, as she presents to the world fortunes of unheard-of dimensions, so also she presents citizens whose generosity far surpasses that of princes. Here is at last the "native land of kings," men who live and spend for the people. Once make a start in park building, show yourselves competent to care for such property, and the problem of acquisition is solved. Surely the man who has built a gallery for the display of art for paintings and carvings which are but man's transcript of nature's work, of sky and field and fountain and forms that live, will not hesitate to place before his fellow men the original of it all, the handiwork of an artist, men are pleased to call Divine. Men who give millions to educate people in science, who build great structures for our universities and schools, will not neglect to provide for the education of our citizens in matters pertaining to natural beauty, in the adornment of our common home, the earth; in the adornment of gardens and walks and parks in the one direction that leads to the common progress of all. And such men are with us. I spoke of the parks of Cleveland. Of the thousands of acres there included more than three-fourths, if I am rightly informed, has been

given to the city by her own citizens. The names of Gordon and Wade are immortalized by their gifts. The name of Vanderbilt stands to many but as a sign of unheard-of fortune, but Biltmore Forest rises as a perpetual memorial of the wise generosity of a Vanderbilt who is giving the people of Ashville, N. C., a park which will be almost without a rival on the planet, and will at the same time afford the whole American people an object lesson in forestry and forest management that is worth the effort of a thousand talking professors. Just as there are everywhere men who delight to accumulate libraries, collections of fossils, "curios," only to leave them at the last to some municipal control, so you will find men improving their lands, devoting years to make the face of nature a store of beautiful things only at the last to turn it all to the care of the public. This is no theory, this is history; it is more; it is human nature. Shakespeare, the greatest dramatist that ever depicted the passions of humanity, seems to have understood this very point. Read the speech of Antony in "Julius Cæsar." Cæsar had been slain, and when Antony would stir the mob to vengeance, what does Shakespeare bid him do? He brings forth Cæsar's will—his bequests to the people of Rome; and the very climax of Cæsar's liberality, the clause which shall at once proclaim the testator's greatness and move to frenzy those who are legatees. What is it?

"Moreover, he hath left you all his walks,
His private arbors and newly planted orchards,
On this side Tiber; he hath left them you,
And to your heirs forever, common pleasures,
To walk abroad and recreate yourselves.
Here was Cæsar! When comes such another?"

Are Americans less generous than the Roman Cæsar? Rather may we ask: Are they less appreciative of public need than were Englishmen in Shakespeare's day, 300 years ago?

I have said this much to show that the acquisition of park grounds is practicable. But we must make a start. Somebody must make a start, and none can do that thing so well as our municipal authorities. All over the east the start is making. Shall the progressive west lag behind?

But I am advised that I am talking to practical men, men of affairs, men who have little regard for schemes or theories, however fair, who look only at that which is immediately practicable and feasible. I think my argument so far is perfectly sound, perfectly infragable in beginning, middle and conclusion, but I propose to make it doubly sure. I wish to tell you another thing, another fact that is certain to appeal to every man who has a drop of American blood in his veins, whether by heredity or adoption, and that fact is:

PARK BUILDING PAYS.

When I was in Montana not long ago, a gentleman called to see me and invited me to come to the city in the morning. "I have a very handsome proposition I want to show you," he said. I went as invited and found that his proposition was a gold-mining scheme by which I was in a few months to make Rockefeller turn green with envy. Gentlemen, I have a proposition for you: Build a park in a suitable place near your city, lay out and construct a highway thither, and you will more than double all the assess-

able property in the neighborhood in a single year. The park commissioners of Chicago say that the boulevards and park system of Chicago have increased the value of contiguous property from 300 to 500 per cent. The park commissioner of Cleveland says the same thing. The conversion of the salt marshes near Boston into a part of the city park system has increased the value of all the property there in an inestimable way; has given it value, so that lands before worthless are now worth hundreds of dollars a foot.

The park commissioner of Cleveland, to whom I am indebted for many facts in this connection, says: "Every roadway that is opened and made pleasantly passable connecting the business portion of the city with its park system will increase the value of the property in the suburbs and along the lines of these roadways 300 per cent, and will add to the taxable value when these improvements are made and the lands adjacent are built up, as they will be, from five to ten times the present valuation of the property."

* That strikes you, gentlemen. The building of a park adds to the taxable value of all adjoining property. Property easy of access and with delightful outlook becomes in Iowa every day more valuable. Every dollar you expend wisely in park improvement will come back to you as municipalities and communities over and over again in actual income—available cash. Now, these are facts undisputed, and one would think there could be nothing stronger than that. But there is. I have another fact for you. A public park is in and of itself an investment on which the public in mere dollars can never lose. Take such property, improve it, care for it, and its cash value will never go back, but will still increase in many places in a marvelous manner. Suppose Central Park, New York, to have cost \$7,000,000. Go and talk \$7,000,000 to the people of New York to-day! \$70,000,000 would not touch it. And so everywhere else. Of course, we deal in hundreds and thousands, not millions, but I am satisfied to win hundreds when it means a return of the entire investment. You remember the Arab merchant's 1 per cent. He bought for \$10 and sold for \$20; he said his profit was only 1 per cent. I am satisfied with 1 per cent.

But I need not spend time on this phase of my argument. Everybody knows that beauty, attractiveness, like godliness, is profitable, pays. No people understand this better than the real estate men. I have before me an advertisement for the sale of certain Chicago property; the chief attraction set forth in bold black type is that the property fronts a park. "Oak Lawn," "Riverside," "Menlo Park," these are catch-titles. Why? Because they mean beauty, refinement, progress, culture.

Mr. President, gentlemen, the problem before us goes deep. It affects profoundly the destinies of our people. The foundations of the republic are in its homes, its home life, its patriotism we say, which means simply the love of what is our own, domestic sanity and soundness. Some of us may have seen the Zuni villages of Arizona plains, where grey adobe houses bleach all day in the summer sun in the midst of desert plains that stretch bare and dry and dead to the horizon's level rim. That may do for a people such as that, but ours is not the civilization of the Aztec plain. Some of us have seen the worn-out hills and naked valleys of old decadent Spain, where for miles and miles in midsummer heat no green

* L. E. Holden, l. c. p. 47.

thing lifts its sign of solace to the weary human eye; where bald, miserable, stony huts shelter an idle, utterly worthless people, shifting from side to side of their wretched homes, as day goes by, in search of shade; but our civilization is not the civilization of barren, dead and worn-out Spain. And some of us may have seen the congested streets of the great manufacturing cities, whether of the old world or the new; we have seen thousands sweltering in close-walled houses by day; seeking in vain at night, coolness on stony streets and curbs; but these are the abodes of anarchy and every discontent; revolution springs from soil like this and American civilization has no foundation here. No, my friends, our freedom is the freedom of nature; the flower of liberty blooms only in the open. For free institutions we must have not only the fertile fields, but the green forest, the home-sheltering grove, the shaded lake, the perennial stream. "No man can love an unbeautiful land. No people, no civilized people, can long remain content when all vestige of natural beauty has been removed from sight, nor can a free government rest upon an unhappy or discontented people. The French revolution came when rural France was almost a desert. The German loves the Fatherland because of its beauty. He will ever bear imperial tyranny if he may but gaze upon the forest-bordered streams. England is a land of parks, not in the great cities only, but everywhere from Land's End to John O'Groat's, and we know what Englishmen think of England. If we wish our own people to most speedily reach the maximum of contented peace we shall exert ourselves to preserve to our God-given heritage its original, wonderful features of surpassing natural beauty."*

The public park and the public school, both are for the people, both the expression of public or private beneficence. The one makes for the mental soundness and discipline of the citizen; the other for his physical happiness and health. The public school opens the eyes of the mind to the wide fields of human activity and learning; the public park spreads before the natural eye the allurements of natural beauty which for all ages and conditions invite to health and rest and peace. Which is the more important, who shall say?

* T. H. Macbride, 1st Rep. Pk. and Outd. Art Assn, p. 41.

XVII.

HINTS ON RURAL SCHOOL GROUNDS.*

One's training for the work of life is begun in the home and fostered in the school. This training is the result of a direct and conscious effort on the part of the parent and teacher, combined with the indirect result of the surroundings in which the child is placed. The surroundings are more potent than we think; and they are usually neglected. It is probable that the antipathy to farm life is formed before the child is able to reason on the subject. An attractive play-ground will do more than a profitable wheat crop to keep the child on the farm.

2. THE FACT.

Bare, harsh, cheerless, immodest,—these are the facts about the average rural school ground. Observe Fig. 21.

21—Where children are taught. An actual example in one of the most prosperous fruit-growing sections of New York.

*L. H. Bailey, in Bulletin 160, Cornell University Agricultural Experiment station, Ithaca, N. Y. The copy and cuts for this reprint were kindly furnished by the University.

22—A suggestion in planting.

Children cannot be forced to like the school. They like it only when it is worth liking. And when they like it, they learn. The fanciest school apparatus will not atone for a charmless school ground. A child should not be blamed for playing truant if he is sent to school in a graveyard. Observe Fig. 23.

23.—The beginning and the end,—schoolhouse and graveyard. In eastern New York.

It would seem that land is very precious. Very little of it can be afforded for a school ground. A quarter of an acre of good land will raise four bushels of wheat, and this wheat may be worth \$3 or \$4 a year. We cannot afford to devote such valuable property to children. We can find a bit of swamp, or a sand hill, or a treeless waste. The first district school I taught was on a heartless hillside. The premises had two or three disconsolate oaks, and an old barrel was stuck in the top of one of them. The second school was on an island in a swamp. The mosquitoes loved it.



24.—A suggestion for a simple little schoolhouse.

The school building is generally little more than a large box. It has not even the charm of proper proportions. A different shape, with the same cost, might have made an attractive building. Even a little attention to design might make a great difference in the looks of a schoolhouse; and the mere looks of a schoolhouse has a wonderful influence on the child. The railroad corporation likes to build good-looking station-houses, although they have no greater capacity than homely ones. I asked an architect for a simple plan of a cheap schoolhouse. He gave me Fig. 24. Plans for the improvement of schoolhouses may be obtained of the Superintendent of Public Instruction, Albany.

The following sentences are extracted from the "Report of the Committee of Twelve on Rural Schools," of the National Educational Association (1897).

"The rural schoolhouse, generally speaking, in its character and surroundings is depressing and degrading. There is nothing about it calculated to cultivate a taste for the beautiful in art or nature."

"If children are daily surrounded by those influences that elevate them, that make them clean and well-ordered, that make them love flowers, and

pictures, and proper decorations, they at last reach that degree of culture where nothing else will please them. When they grow up and have homes of their own, they must have them clean, neat, bright with pictures, and fringed with shade trees and flowers, for they have been brought up to be happy in no other environment."

"The rural schoolhouse should be built in accordance with the laws of sanitation and modern civilization. It never will be until the State, speaking through the supervisor, compels it as a prerequisite for receiving a share of the public funds."

b. HOW TO BEGIN A REFORM.

We will assume that there is one person in each rural school district who desires to renovate and improve the school premises. There may be two. If this person is the school commissioner or the teacher, so much the better.

Let this person call a meeting of the patrons at the schoolhouse. Lay before the people the necessity of improving the premises. Quote the opinions of intelligent persons respecting the degrading influence of wretched surroundings; or even read extracts from this bulletin. The co-operation of the most influential men of the district should be secured before the meeting is called.

Propose a "bee" for improving the school grounds. John Smith will agree to repair the fence (or take it away, if it is not needed). Jones will plough and harrow the ground, if plowing is necessary. Brown will sow the grass seed. Black and Green and White will go about the neighborhood with their teams for trees and bushes. Some of these may be got in the edges of the woods, but many of the bushes can be picked up in front yards. Others will donate their labor towards grading, planting, and cleaning up the place.

The whole thing can be done in one day. Perhaps Arbor Day can be chosen.

c. THE PLAN OF THE PLACE.

This is the most important part of the entire undertaking—the right kind of a plan for the improvement of the grounds. The person who calls the meeting should have a definite plan in mind; and this plan may be discussed and adopted. The remainder of this bulletin is devoted to plans for school grounds and means of working them out. If any person is interested in this subject, he should have our Bulletin 121, on the "Planting of Shrubbery."

Begin with the fundamentals, not with the details.—If an artist is to make a portrait, he first draws a few bold strokes, representing the general outline. He "blocks out" the picture. With the general plan well in mind, he gradually works in the incidentals and the details—the nose, eyes, beard.

Most persons reverse this natural order when they plant their grounds. They first ask about the kinds of roses, the soil for snowballs, how far apart hollyhocks shall be planted. It is as if the artist first asked about the color of the eyes and the fashion of the necktie; or as if the architect first chose the color of paint and then planned his building. The result of this type of planting is that there is no plan, and the yard means nothing when it is done. Begin with the plan, not with the plants.

The place should mean something—The home ground should be home-like, retired and cozy. The school ground should be set off from the bare fields and should be open enough to allow play grounds. It should be hollow—well planted on the sides, open in the interior. The side next the highway should contain little planting. The place should be a picture, not a mere collection of trees and bushes. Fig. 25 shows what I mean.

As seen in the picture (Fig. 25), this style of planting seems to be too elaborate and expensive for any ordinary place. But if the reader will bear with me, he shall learn otherwise.

25—A picture, of which the schoolhouse is the central figure.

Keep the center of the place open.—Do not scatter the trees over the place. They will be in the way. The boys will break them down. Moreover, they do not look well when scattered over the whole area. When an artist makes a picture with many people in it, he does not place the persons one by one all over his canvas. He masses them. Thereby he secures a stronger effect. He focusses attention, rather than distributes it.

The diagrams (Figs. 26, 27), taken from Bulletin 121, make this conception plain. The same trees and shrubs can be used to make either a nursery or a picture. But it is more difficult to make the nursery, and to keep it in order, because the trees grow one at a place in the sod, and they are exposed to accidents.

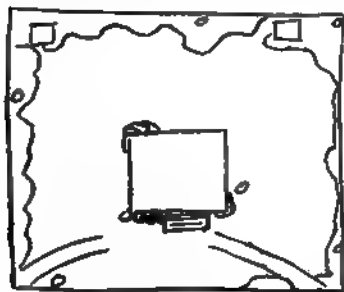
Go to the blackboard. With four lines represent the borders of the school grounds, as in Fig. 28. Indicate the schoolhouse and the out-buildings. Existing trees may be located by small circles. Now you have the facts, or the fixed points.

Now put in the first walks. The first fixed point is the front door. The other fixed point is the place or places at which the children enter the grounds. Join these points by the most direct and simplest curves possible. That is all there is of it. In many, or perhaps most places, the house is so near the highway that only a straight walk is possible or advisable.

26—The common or nursery type of planting.

Next comes the planting. Let it be irregular and natural, and represent it by a wavy line, as in Fig. 28. First of all, cover up the outhouses. Then plant heavily on the side next the swamp or a disagreeable barnyard, or in the direction of the prevailing wind. Leave openings in your plan wherever there are views to be had of fine old trees, attractive farm homes, a brook, or a beautiful hill or field. Throw a handful of shrubs into the corners by the steps, and about the bare corners of the building.

You now have a plan to work to. It has been the work of five minutes at the blackboard.

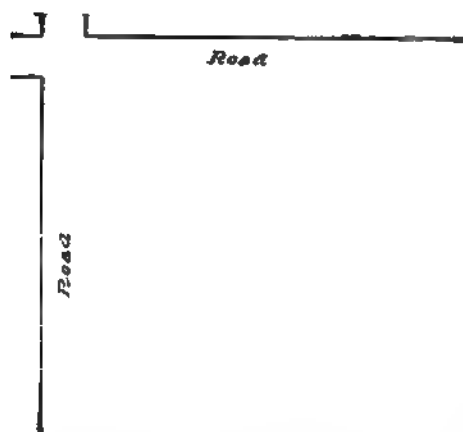


28—The blackboard plan.

27—The proper or pictorial type of planting.

Sometimes the problem is not so simple as all this. There may be three entrances to the grounds and a highway on two sides. Fig. 29 is a plan made for such a place in western New York. It was thought to be necessary to separate the play-grounds of the boys and girls. This was done by a wide hedge-row of bushes running back from the schoolhouse.

An interesting case as shown in Figs. 21 and 22. It is indecent to put the two outbuildings together. But it



29—Suggestions for the planting of a school-yard upon four corners. From "Lessons with Plants."

was assumed that it would not be allowable to move them. The place is bald and cheerless. The outlay of a day's work, and no money, might cause it to look like Fig. 22 inside of three or four years.

Perhaps some persons object to so much shrubbery. They look upon it as mere brush. Very well, then use trees alone. But do not scatter them hit and miss over the place. Throw them in at the side, as in Fig. 30. Give room for the children to play; and make the place a picture at the same time. Three or four trees may be planted near the building

to shade it, but the heaviest planting should be on the sides.

The mere planting of trees and shrubs is the smaller part of the problem.—Arbor Day has emphasized the mere planting of trees. Fortunately many of the trees do not live. They are too often put in the wrong places. If the love of trees could be combined with some purpose in the planting the results would be much better. Fig. 31 suggests Arbor Day planting; and this is certainly much better than nothing. These four trees will be useful in their present positions, but the place will still remain bare.

30—A border planting of trees.

The great thing—the border planting—has been omitted, and the incidental thing has been done.

Observe how the long foliage-mass adds charm to Fig. 32. A row is better than mere scattered trees. But even this planting is not ideal. Heavy planting should have been made along the fence beyond the school-house. There are too many trees between the border row and the house, although this is not a serious fault. A few bushes and vines would relieve the barrenness of the house; so would one or two trees close against the house on the side next the road. But this place is so much more attractive than most rural school premises that one ought not to find fault with it.

d. HOW TO MAKE THE IMPROVEMENTS.

Every effort should be exerted to do the work well in the beginning. If all preparations are thoroughly considered, and the details carried out with care, the premises should become more attractive year by year with almost no annual outlay of labor. The school grounds should be able to

31--Trees enough in the center, but the place needs a back-ground.

32--A row of willows makes the place attractive.

take care of themselves when once the place is set in order. Of course better results are to be expected when much labor is put on the grounds each year, but it is useless to advise such expenditure for the rural schools. But it is surprising what excellent results can be secured with almost no atten-

tion from year to year. The beautiful garden in Fig. 34 has received practically no labor for three years except that required to mow the grass.

Making the sod.—In many cases the school yard is already level or well graded and has a good sod, and it is not necessary to plow it and re-seed it. It should be said that the sod on old lawns can be renewed without plowing it up. In the bare or thin places, scratch up the ground with an iron-toothed rake, apply a little fertilizer, and sow more seed. Weedy lawns are those in which the sod is poor. It may be necessary to pull out the weeds; but after they are out, the land should be quickly covered with sod or they will come in again. Annual weeds, as pigweeds, ragweeds, can usually be crowded out by merely securing a heavier sod. A little clover seed will often be a good addition, for it supplies nitrogen and has an excellent mechanical effect on the soil.

The ideal time to prepare the land is in the fall, before the heavy rains come. Then sow in the fall, and again in early spring on a late snow. However, the work may be done in the spring, but the danger is that it will be put off so long that the young grass will not become established before the dry, hot weather comes.

The only outlay of money required for the entire improvement is for grass seed. The best lawn grass for New York is June-grass or blue-grass. Seedsmen know it as *Poa pratensis*. It weighs but fourteen pounds to the bushel. Not less than three bushels should be sown to the acre. We want many very small stems of grass, not a few large ones; for we are making a lawn, not a meadow.

Do not sow grain with the grass seed. The June-grass grows slowly at first, however, and therefore it is a good plan to sow timothy with it, at the rate of two or three quarts to the acre. The timothy comes up quickly and makes a green; and the June-grass will crowd it out in a year or two. If the land is hard and inclined to be too dry, some kind of clover will greatly assist the June-grass. Red clover is too large and coarse for the lawn. Crimson clover is excellent, for it is an annual, and it does not become unsightly in the lawn. White clover is perhaps best, since it not only helps the grass but looks well in the sod. One or two pounds of seed is generally sufficient for an acre.

At first the weeds will come up. Do not pull them. Mow the lawn as soon as there is any growth large enough to mow. Of course, the lawn mower is best, but there is no use of recommending it for rural school yards. Then use the ordinary field mower. When the sod is established, mowing the yard three or four times a year will be sufficient. And here is another advantage of the open-centered yard which I have recommended,—it is easily mown. It would be a fussy matter to mow a yard planted after the fashion of Fig. 26; but one like Fig. 27 is easily managed. A yard like Fig. 25 can be mown in a half hour.

How to make the border planting.—The borders should be planted thick. Plow up the strip. Never plant these trees and bushes in holes cut in the sod. Scatter the bushes and trees promiscuously in the narrow border. In home grounds, it is easy to run through these borders occasionally with a cultivator, for the first year or two.

Make the edges of this border irregular. Plant the lowest bushes on the inner edge. Fig. 33 shows how a certain yard was marked out for the planting. The whole area had been plowed, rolled, harrowed and

raked. Grass seed had been sown and raked in. Then a line was drawn, by means of a rake handle, to represent the edges of the border planting. The interior or lawn space was now rolled, and the soft area along the borders was left for the planting. Five years later, the place looked as shown in Figure 34. Imagine a schoolhouse at the end of that garden!

For all such things as lilacs, mock-oranges, Japan quinces, and bushes that are found along the roadsides, two or three feet apart is about right. Some will die anyway. Cut them back one-half when they are planted. They will look thin and stiff for two or three years, but after that they will crowd the spaces full, lop over on the sod, and make a billow of green. Prepare the land well, plant carefully, and let the bushes alone.

The kinds of plants for the main planting.—We now come to the details—the particular kinds of plants to use. One great principle will simplify the matter; the main planting should be for foliage effects. That is, think first of giving the place a heavy bordermass. Flowers are mere decorations.

33.—A newly made landscape garden, ready for the border planting.

Select those trees and shrubs which are the commonest, because they are the cheapest, hardest and most likely to grow. There is no district so poor and bare that enough plants cannot be secured, without money, for the school yard. You will find them in the woods, in old yards, along the fences. It is little matter if no one knows their names. What is handsomer than a tangled fence row?

Scatter in a few trees along the fence and about the buildings. Maples, basswood, elms, ashes, buttonwood, pepperidge, oaks, beeches, birches, hickories, poplars, a few trees of pine or spruce or hemlock—any of these are excellent. If the country is bleak, a rather heavy planting of evergreens about the border, in the place of so much shrubbery, is excellent.

For shrubs, use the common things to be found in the woods and swales, together with roots, which can be had in every old yard. Willows, osiers,

witch hazel, dogwood, wild roses, thorn apples, haws, elders, sumac, wild honeysuckles—these and others can be found in every school district. From the farm yards can be found snowballs, spireas, lilacs, forsythias, mock-oranges, roses, snowberries, barberries, flowering currants, honeysuckles and the like.

24.—Five years' growth upon the area shown in Fig. 23. On the Cornell horticultural grounds. From our Bulletin 191.

Vines can be used to excellent purpose on the outbuildings or on the schoolhouse itself. The common wild Virginia creeper (shown on the right in Fig. 36) is the most serviceable. On brick or stone schoolhouses the Boston ivy or Japanese ampelopsis may be used, unless the location is bleak. This is not hardy in the northern part of the State. Honeysuckles, clematis and bitter-sweet are also attractive. Bowers always interest children; and actinidia (to be had at nurseries) is the best for this purpose.

25—It is easy to make a yard as good as this.

Kinds of plants for decoration.—Against these heavy borders and in the angles about the building, many kinds of flowering plants can be grown.

The flowers are much more easily cared for in such positions than they are in the middle of the lawn, and they also show off better. Notice how striking the hollyhocks are in Figs. 34 and 37. They have a background. Even a clump of weeds looks well when it is in the right place. Observe Fig. 36.

It is impossible to grow many flowers in the school ground under present conditions, for what is everybody's business is nobody's business; and then, the place is neglected all through the summer. But the children can be taught to plant many thing.

Only those flowers should be used which are very easy to grow and which have the habit of taking care of themselves. They should also be such as bloom in the spring or fall, when the school is in session. Perennial plants

26—A clump of weeds in the corner by the house — motherwort and Virginia creeper. How pretty they are!

—those which live from year to year—are excellent. Of these, day lilies, bleeding hearts, pinks, bluebells, hollyhocks, perennial phlox and hibiscus, are always useful. Nothing is better than the common wild asters and goldenrods. They will grow almost anywhere and they improve when grown in rich ground and given plenty of room; and they bloom in the fall.

Many kinds of bulbs are useful, especially as so many of them bloom very early in spring. We propose to issue a nature-study leaflet on this subject the coming season. Think of a school yard with crocuses, daffodils and tulips in it!

Annual flowers may be grown along the borders, out of the way of the play grounds. China asters, petunias and California poppies are very attractive, and they are easy to grow. They bloom in the fall. Phlox, sweet peas, allyssum, and many others are also useful.

37.—A dainty bit—flowers against a background.

While the main planting should be made up of common trees and shrubs, a rare or strange plant may be introduced now and then from the nurseries, if there is any money with which to buy such things. Plant it at some conspicuous point just in front of the border, where it will show off well, be out of the way, and have some relation to the rest of the planting. Two or three purple-leaved or variegated-leaved bushes will add much spirit and verve to the place; but many of them make the place look fussy and overdone.

e. GENERAL REMARKS.

More than one third of all public schools will probably always be in the country. They will have most intimate relations with rural life. We must make that life attractive to the pupils.

In Europe there are school gardens, and similar plans are recommended for this country. It is certainly desirable that some area be set aside for the actual cultivation of plants by the children and for the growing of specimens to be used in the schoolroom. However, the conditions of Europe are very different from ours. In the rural school in Germany and other countries, the schoolhouse is the teacher's home. He lives in it, or by it. The summer vacation is short. In this country, there is no one to care for the rural school ground in the long summer vacation. Teachers change frequently. It is impossible to have uniformity and continuity of purpose. In the old world, the rural schools are in the hamlets.

We shall be very glad to correspond with any persons who are interested in improving school premises, either on the lines herein suggested, or in other directions. The improvement must come, or, one by one, the rural schools will die out for lack of pupils. In the struggle for existence, the pupils will more and more seek the more attractive schools. There must be rural schools, whether in the open country or in the hamlet; and wherever they are, they must be cheered and brightened.

A Flower day every October would be a fitting complement of Arbor day. Already, flower shows have been held in various rural schools. They are symbols of the harvest. We want to focalize this movement in the coming year. We call upon every citizen for sympathy and co-operation.

A revolution in rural school grounds will not come suddenly. Here and there a beginning will be made; and slowly the great work will spread.

XVIII.

SANITATION AS APPLIED TO THE HEALTH OF CHILDREN FED ON COW'S MILK.*

To me has been assigned the opening remarks, or, as I shall state it, the presentation of some thoughts for discussion on the very important subject of sanitation as applied to the health of children fed on cow's milk. It seems to be necessary to raise a large number of children on some other aliment than that which was designed by nature, viz., the mother's milk, but owing to many causes on the part of the mother, this is found to be impractical, and in many cases impossible. Owing to the advanced ideas under our present civilized state, this cannot be done, owing to the methods in vogue, and in the manner in which our girls are raised it is impossible for them to nurse their offspring. The mammary glands are not developed properly, they are often flat, and the nipples sunken, caused by pressure upon these glands; they are not capable of furnishing the proper amount of good nourishing milk to support the child and enable it to grow strong and healthy. Some of our wives and mothers are too badly diseased to allow the children to partake of this poisonous and vitiated nutriment. The causes are too numerous to name them all, preventing children from being raised on the natural food designed for their use; consequently artificial foods have been resorted to to overcome this difficulty. Of these the market is flooded, and many of them are very good, as is proven by the children themselves growing up strong and healthy under their use. I might mention a number that have become household words, but by far the larger part of our children are raised on cow's milk, sometimes alone, and in some instances mixed with other nutrient materials, thus trying to simulate the milk of the mother.

With these preliminary thoughts, let us look at our text and see why we should call the attention of the profession, as well as the laity, and more especially the sanitarians, to the necessity of doing all that is possible to stay the ravages of the fell destroyer of our infant population. It is not disease alone that is causing such a frightful mortality among children. While duration of (woman's) life has been increased to such a great extent as we find it to be, as shown by tables of life insurance companies and others who are paying attention to this subject, the death rate in children is but little diminished in the last fifty (50) years. There must be a cause for the terrible slaughter of the innocents, especially under 1 year of age, despite all our boasted civilization, for statistics prove that more than one-

* By Dr. John O. Shrader, Iowa City, Member Iowa State Board of Health.

fifth (1-5) of all deaths occur in children under the age of 1 year. Is it not the Herod of ignorance that thus exterminates our children? Is it not high time that we cry aloud and cease not, until this terrible death rate has been abolished? Notwithstanding our vaunted civilization, it must be humiliatingly owned that but little progress has been made. Milk plays an important part of this role of death. In spite of our sanitary inspections of milk, every day it becomes more dangerous to those whose principal sustenance it is, and we will attempt to show why this is so. Let us look what fraud and folly are constantly doing and we shall cease to wonder why they fall such an easy prey to death. I am aware that it is difficult to get accurate and reliable statistics to prove our point. But we have statistics from one city, at least, where the death certificates of children must show whether they were brought up by nursing a woman or by artificial foods, viz., Berlin, and there statistics show that in 10,000 deaths of children three-fourths were fed on artificial foods. In Bavaria it has been proven in a series of 400 deaths from summer diarrhoea, 96 per cent were fed on artificial foods. Then take Hope's statistics in England, which disclose the fact that only 3 per cent to a thousand deaths were of children nourished by the milk of the mother or breast fed. The great substitute for the mother's milk is cow's milk, and it is not straining a point to say that much is being done every day to unfit it as a substitute for the milk of the mother. Let us first call your attention to the manner in which the cows are kept in a large proportion of the dairies where milk is sold for human food. The cows are kept in dirty, unventilated stables, full of foul-smelling odors, and here the dairyman with unclean hands milks the cows without cleansing the udders. Therefore it is impossible to procure sweet, clean and healthy milk, fit for food. But instead the milk contains active colonies of bacteria damaging to the milk, and some as the *coli communis*, disgusting to a person of sensitive stomach, all of which could and should have been prevented.

It has been proven that one of the chief difficulties in the way of rearing children on cow's milk is the prevention of the bacteria that float in countless numbers in the air of the stables, thus poisoning the milk and rendering it unfit for food, and especially for children, whose digestion is so easily impaired. The milk thus deteriorated is rendered inimical to the digestive apparatus of the child; milk thus poisoned keeps sweet but a short time, and the child thus fed suffers from green, foul smelling discharges from the bowels. Milk has been found to be an excellent medium for the cultivation of microbes of various kinds. How often has it been observed that when typhoid fever, scarlatina or other infectious diseases, found in the family of the dairyman or the vendor of milk, that the children of families using the milk were almost sure to suffer from attacks of the same diseases, proving most conclusively that the disease was carried in the milk to the non-immune, and also proving that milk is an excellent carrier of contagion and infective materials. Along with these grave disadvantages to the use of cow's milk, we know that it is largely adulterated, which is found to be the worst in the poorer districts of our large cities and towns.

It is largely adulterated by adding one part water to two of milk, and this too to milk that has already been skimmed and watered by the vendor, who it is well known has not the best reputation for honesty. When this

is used for food, starvation must be the result. Then again, the bottles in general use for the feeding of children are a nuisance, or at least the manner in which they are kept is little less than murder to these poor, weak, half-starved children. It is no wonder the mortality is so great. Nothing short of rigid legislation of the most stringent character can control this constant and rapidly growing evil.

The laws that we have on this important subject of the adulteration of food are violated every day, and they are already so lax that they fail to meet the requirements of the case, and must be shown in their true and appalling light to arouse the people, and through them the law-making power, in order to correct the evil. If the food is deficient in fat making properties, and then in connection with this, is full of noxious germs, the poor innocents have but a poor chance indeed to make healthy, vigorous children, such as should be reared in order to make good citizens. These are some of the underlying causes of crime. We all know that crimes of the deepest dye are found among the half-starved population of our cities and towns. It is an axiom that to raise healthy children they must be well fed, and the quality of the food supplied must be carefully inquired into and all impure food condemned. This is as important as the quantity furnished.

In addition to all this, what shall be said of the nostrums furnished in the shape of soothing syrups? To these ill fed, starving children, crying from the lack of food, the nurse too often, to keep the child from being fretful, resorts to the use of opiates, or other poisonous drugs, saying that they have colic. They may be suffering from indigestion, but this is not the way to cure them. Give good nourishing food in suitable quantities and from clean receptacles, and you will have nice, healthy children, good natured and with rosy cheeks, instead of pale, wan, sickly things reared as I have stated.

Again, there is such a thing as starch poisoning. Many nurses, even mothers, insist on giving children solid food containing starch. Their salivary glands are not sufficiently developed to convert this starch into sugar, and, as a result, we have indigestion of the most severe type. As the starch could not be converted into sugar, it undergoes fermentation in the alimentary canal, and the little sufferers cry out from flatulence, gripings, and a general derangement of the digestive tract.

When we take a general survey of the situation, we wonder how so few escape and cease wondering at the amount of infant mortality. Good healthy cow's milk, sweet and clean—that obtained from a young cow, or at least one in the prime of life, fed on good, sweet hay or fodder and a suitable quantity of grain in such a condition as can be well digested by the animal and furnished in a fresh state—without having the cream removed, or what is a good method in dairies, is to save the milk of one fresh cow, and as soon as strained, or better, strain it into clean, sweet jars or cans, and kept closed until delivered and ready for use. In young children, or those under six months, add a quantity of pure sugar—the loaf is the best—and transferred to the sweet, aseptically-kept nursing bottle and fed to the infants at regular intervals, and you will hear no complaints of cholera or diarrhoea. A small quantity of water that has been boiled may be added to milk rich in fat, or in case of acidity of the child's stomach, add some lime water, and this will prevent the child's crying, better than all the soothing syrups or other nostrums often sold and used for that purpose.

The query arises, is it possible for these half-starved and poisoned children, whose digestion has been seriously impaired, and whose brain and whole nervous system has been saturated with opiates or chloral until half idiotic, to make strong, vigorous children, with healthy bodies and well-balanced minds? Is it not these and such as these that become the criminals, the murderers, the highwaymen, the drunkards, the licentious, the lewd, and immoral in every respect? They are paranoiacs from birth, or at least from childhood. If these results are true—and are they not?—can we not verify them every day in our practice?

Then why not as sanitarians, as physicians, as teachers of the people, cry aloud and cease not, until the people are properly educated in hygienic measures that pertain so directly to the health and happiness of the proletariat? When a man or woman assumes the high and holy calling of a physician they should be instructors of the people in the communities in which they reside. In this way they render themselves invaluable to their patrons. A few words fitly spoken in regard to sanitary matters, will, in a short time, make you the trusted friend and advisor of the families to which you are called to minister to their aches and pains, even should it be to those whose minds are diseased. I know the question has been asked, who can minister to a mind diseased? Prevention is better than cure. Let us all strive to save life, to better the condition of the people, and thus fulfill our calling.

MILK AS FOOD.*

LETTER OF TRANSMITTAL.

UNITED STATES DEPARTMENT OF AGRICULTURE, }
OFFICE OF EXPERIMENT STATIONS, }
WASHINGTON, D. C., March 1, 1898.

SIR—I have the honor to transmit herewith an article on milk as food, prepared in this office, treating of the nutritive value of milk, and suggesting some of the ways in which it may be combined with other food materials to make well-balanced and economical dietaries. In the preparation of this article the results of the investigations on the nutritive value of foods, including milk, made under direction of Prof. W. O. Atwater, have been utilized, as well as information gathered from other authoritative sources. I recommend that the article be published as a Farmers' Bulletin.

Respectfully,
HON. JAMES WILSON,
Secretary of Agriculture.

A. C. TRUE,
Director.

INTRODUCTION.

A quart of milk contains about the same amount of nutriment as three-quarters of a pound of beef, namely about four ounces. Six ounces of bread would likewise supply not far from four ounces of nutritive substances. To put it in another way, about one-eighth of the whole weight of the milk, one-third of the beef, and two-thirds of the bread consist of actually nutritive ingredients. The other seven-eighths of the milk and one-third of the bread are water, while the two-thirds of the meat which is not actual nutriment is mainly water, but consists in part of bone.

But while the quart, or two pounds of milk, the 12 ounces of beef, and the 6 ounces of bread all supply like amounts of nutriment, the nutritive values are not exactly the same; in other words, they would not be equally useful for food. Either the milk or the bread eaten alone would make a better balanced food for man than the meat, because it contains the different kinds of nutritive ingredients, or nutrients, in proportions more nearly adapted to supply the wants of the body than is the case with the nutrients of the meat.

Milk contains all of the ingredients needed for nourishment; that is, it furnishes the materials which build up the body and keep it in repair, and also those which supply it with fuel to keep it warm and to furnish the animal machine with the power needed to do its work.

* True, Farmers' Bulletin No. 74, U. S. Department of Agriculture.

The composition of milk and other food materials, the kinds and amounts of different ingredients they contain, are found by analysis in the chemical laboratory. But (since analysis is a separation into constituent parts) a rough analysis of milk is made in the dairy and in the kitchen. When milk stands the cream rises. This cream consists of minute particles of fat, surrounded by casein and other substances. The cream is put in the churn and shaken, and the globules of fat gather together as butter. This separation of the butter fat is a partial analysis of the milk. When rennet is added to milk it is curdled. The ferment of the rennet causes the casein to coagulate, forming the curd. This is put in the cheese press, the liquid is pressed out, and the curd is changed to cheese, which contains the casein and with it fat and other materials which were in the milk and were entangled or inclosed in the coagulated casein. The whey from which the curd has been separated contains a kind of sugar, which can in its turn be separated from the fluid, and is prepared commercially and sold as milk sugar. After the sugar has been removed there still remains in the milk considerable amounts of mineral compounds.

If at the outset the milk had been heated, the water might have been evaporated and the casein, fat, sugar, mineral salts, and other materials would have remained as the milk solids. These together make up the nutrients of the milk.

When milk is used for food the casein and allied compounds serve the body for building and repair, and are also used for fuel. The fat and sugar are the chief fuel ingredients. The mineral compounds aid in forming tissue, and have other uses as well, but they are needed only in small quantities.

The value of milk for nourishment is not as well understood as it should be. Many people think of it as a beverage, rather than a food. To understand its nutritive value, and how it compares with other food materials in this regard, we must consider, briefly, the nature, composition, and uses of food materials.

FOOD AND ITS FUNCTIONS.

Food is that which, when taken into the body, builds up its tissues and keeps them in repair or which is consumed in the body to yield force and heat. It is used to form the tissues and fluids of the body, such as muscle, blood, bone, and brain, to repair their waste, and, if in excess of the daily requirements, it may be stored in the body for future consumption. The material thus stored is principally fat. When food or body tissue is consumed in the system, the energy which lay latent therein becomes active and manifests itself in the force or heat required for the various bodily uses.

The best foods are those which perform their function in the most thorough and complete manner; that is, with as little waste as possible and with the best physiological results. We usually judge of the value of a food by several different standards. Thus, it must be digestible and palatable, furnish the ingredients needed by the system in proper amounts, and be reasonably cheap.

Some food materials contain inedible portions, such as bone, shell, skin, etc. The edible portion of food materials consists of water and of some or all of the four classes of nutrients—protein, fat, carbohydrates, and min-

eral matter. The protein compounds are those which contain nitrogen, and are necessary for the repair of old and the building of new tissue. When in excess of what is thus needed they may be simply burned to produce the required force. Body tissue when broken down also yields energy. Familiar examples of protein are lean of meat and fish, white of egg, casein of milk (and cheese), and gluten of wheat. The fats and carbohydrates are used as a source of energy or force. Fat is found in fat meats, lard, fat of milk (butter), and oils—such as olive oil. Starches, sugars, and woody fiber or cellulose form the bulk of the carbohydrates. The protein, fats, and carbohydrates are all organic substances; that is, they can be burned with the formation of various gases, chiefly carbon dioxide and water, leaving no solid residue. The mineral matters will not burn and are left behind when organic matter is ignited.

The most familiar mineral compounds in food are perhaps calcium phosphate (bone phosphate, or phosphate of lime) and sodium chlorid (common salt).

In order to have some measure for expressing the amount of heat that a given substance is capable of yielding, the calorie is taken as a unit. Roughly speaking, this is the amount of heat required to raise the temperature of one pound of water 4 degrees Fahrenheit. One pound of sugar or starch would, if burned and all the heat utilized, raise 1,860 pounds of water 4 degrees in temperature; or it would raise five gallons of water from the freezing point to the boiling point, but would not cause it to boil.

The fuel value of a pound of protein as it is ordinarily burned in the body is very nearly the same as that of a pound of carbohydrates, but fats have a fuel value of two and one-fourth times that of protein and carbohydrates, or 4,220 calories per pound.

COMPOSITION OF MILK.

The chief bulk of milk is, of course, made up of water, the amount of which may vary even in ordinary unadulterated milk from 90 per cent in a very poor product to 84 per cent in an unusually rich milk. The corresponding solid matter, or "total solids," varies from 10 per cent to 16 per cent. This solid matter, or "total nutrients," is made up of protein, fats, carbohydrates, and mineral matter. The proportion of these vary within certain limits; but, roughly speaking, one-twentieth of the total solids are mineral substances, one-fourth protein, three-tenths fat, and four-tenths carbohydrates.

The protein compounds of milk.—The principal nitrogenous compound of milk is casein. This, when the milk is drawn from the cow, is in a form which is called caseinogen, but undergoes changes which bring it into the form of casein. For convenience it is here referred to in all its forms as casein. In chemical composition the casein differs from the other protein compounds of milk in that it contains both phosphorus and sulphur. Besides the casein there is a certain amount of albumin present, called lact-albumin, or albumin of milk. This is more or less similar to the albumin which occurs in the blood and in white of egg. The quantity of albumin is very much smaller than that of the casein, being on the average about one-seventh of the total protein. There are other nitrogenous substances occurring in milk, but in insignificant quantities. The total

protein of milk should not vary in any great degree. It will average not far from 3.3 per cent of the whole milk, or about 25 per cent of the total solids.

The fats of milk.—The fat of milk is commercially the most important of its constituents, since it is the source of butter and enters largely into the composition of cheese. Chemically speaking, the fat of milk, or butter fat, as it is more often called, consists of several different fats. The chief of these are the same fats that make up the bulk of fat meat (tallow, lard, etc.), as well as many vegetable fats. They are called stearin, palmitin, and olein. Besides these three fats there are others in smaller amounts, but of considerable importance, since it is to them that the flavor and aroma of the butter is due. The amount of fat in milk varies widely, the amount in normal milk depending upon various conditions, some of which are mentioned beyond. The amount of fat should not fall below 3 per cent, and, except in unusually rich milk, will not exceed 5 per cent. Good unadulterated milk from a herd of well fed cows should average not far from 4 per cent of butter fat, or about 31 per cent of the total solids of the milk.

The carbohydrates of milk.—The chief compound of this class which occurs in milk is lactose, or sugar of milk. Milk sugar is similar in chemical composition to cane sugar, but is not nearly as sweet. It is largely used by physicians and pharmacists as the basis of powders and pills. In amount it ranges from 4 to 6 per cent, but on the average may be said to be 5 per cent, of the milk, or about 38 per cent of the total solids.

There is considerable variation in the composition of the milk of different animals. The richest milk appears to come from the dog, the poorest from the horse. Human milk is richer in sugar and poorer in protein than cow's milk, but the fuel value is about the same. These facts are brought out in the following table:

COMPARATIVE COMPOSITION OF VARIOUS KINDS OF MILK.¹

KIND OF MILK.	Water.	Total solids.	PERCENT.							Fuel value per pound.
			Protein.	Carb.	Fat.	Miner.	Water.	Calories.		
Woman	87.4	12.6	1.0	1.3	2.3	3.8	6.3	8	219	
Cow	87.3	12.7	3.0	5	3.5	3.7	4.9	7	213	
Dog	73.4	26.6	6.1	5.1	11.2	9.5	3.1	7	271	
Ewe	80.8	19.2	5.0	1.5	6.5	6.8	4.9	6	202	
Buffalo	81.4	18.6	5.3	.8	3.1	7.5	4.1	9	206	
Goat	82.1	17.9	3.1	0.0	9.1	3.3	4.9	6	200	
Goat	85.7	14.3	3.3	1.1	4.3	4.6	4.4	6	203	
Llama	86.5	13.5	3.6	.9	3.9	3.3	5.6	8	212	
Ass	89.6	10.4	7	1.6	2.3	1.6	6.0	5	202	
Horse	91.5	8.5	1.3	.1	1.3	1.2	5.7	3	180	

¹König, *Chemie der menschlichen Nahrungs und Genussmittel*, 3d ed., I, pp. 287-288.

*Per cent. †Calories.

CHARACTERISTICS AND PROPERTIES OF MILK.

The color and opaqueness of milk are due mainly to globules of fat, which are very minute and almost numberless. These are held in suspension in the liquid in the form of an emulsion; but, since they are lighter than water, after the milk has stood for some time they gradually rise to the surface, and thus accumulating form the cream. The action of the separator is on the same principle, only in this case the heavier portion of milk, i. e., the water, casein, and sugar, are thrown as far from the center as possible by the rapidly rotating machine, and the lighter cream, being thus forced to the center, can be drawn off.

When milk has stood for some time, the milk sugar undergoes decomposition, whereby lactic acid is formed and the milk becomes sour. Accompanying this souring of milk, there is a change in its consistency and it becomes thick or curdled. The same change can be brought about by the addition of an acid, vinegar for example. If milk thus curdled is neutralized with some alkali, such as limewater or soda, the curd is redissolved. Milk is also curdled or coagulated by rennet, and the curd thus produced is utilized in the manufacture of cheese. This curd, unlike that of ordinary sour milk, is not dissolved by the addition of limewater or soda.

A scum forms upon the surface of milk when it is boiled. This is probably due to the coagulation by heat of the protein of the milk, chiefly its albumin, but perhaps to a slight extent its casein also.

Milk is slightly heavier than water, its specific gravity ranging from 1.029 to 1.034 at sixty degrees F. This means that while a quart of water weighs two pounds one and one-third ounces, a quart of milk weighs from 1.029 to 1.034 times as much, or not far from two pounds two and one-half ounces. The specific gravity depends upon the proportion of water and other substances. Since the fat is lighter than water, the richer the milk is in butter fat the lower its specific gravity, provided, of course, that the other solids are not increased proportionally. It follows, also, that the removal of the fat increases the specific gravity, so that skim milk has a specific gravity of from 1.033 to 1.037. On the other hand, the addition of water to skimmed milk brings down the specific gravity.

VARIATIONS IN MILK.

Excepting meats, there is probably no one article of food which is liable to so wide a variation in its percentage composition as the milk supplied the consumer. The variations are so great, in fact, as to make it entirely possible that one man may pay nearly twice as much as his neighbor for the same amount of nutrients when both buy it at the same price per quart. The causes of such variations are quite numerous and need be touched upon but briefly. The variation in composition of pure milk is due in a large degree to the breed or individuality of the cow, to the methods of feeding and handling, and the length of time since calving.

With regard to this subject Professor Voorhees¹ says:

The influence of breed is very marked, so much so that dairy breeds are classified into milk and butter breeds—that is, those which give a large quantity of poorer quality, and those which give a smaller quantity of a higher quality. * * * With the improvement of the stock by the introduction of recognized butter-producing breeds of cows the quality of the product also materially improves.

U. S. Department of Agriculture, Office of Experiment Stations, Bulletin 35.

In general young cows produce richer milk than old ones, though much depends upon the health and vigor of the animal. A well-fed cow gives more and better milk than one which is poorly fed, but the relative proportions of fat, casein, and sugar do not appear to be greatly influenced by the composition of the food. The average cow of a given breed possesses certain capabilities for producing milk, but does not reach her normal capacity of milk production unless she is well fed. When once she has a sufficient and well-balanced ration, neither the composition nor the amount of the milk yield seems to be greatly improved by either increasing the ration or changing the proportion of its ingredients.

The milk flow of a given cow is usually largest soon after calving; as the period of lactation increases, the flow gradually falls off, and, as a rule, the milk grows richer, i. e., the proportion of solids increases. The proportion of fat to the other solids in the milk of a given cow varies from day to day and from milking to milking.

Another cause of variation in milk is found in the temptation of unprincipled milkmen to adulterate their product. The chief methods of adulteration are (1) the addition of water, (2) the removal of a portion of the fat, either with or without the addition of water, and (3) the addition of preservatives. The two former methods result in a greater or less diminution of the food value, depending upon the extent of adulteration. The latter method does not detract from the total nutrients in the milk but it adds substances which, while not active poisons, may, when taken in the milk regularly in small amounts, produce deleterious results. The specific gravity of the milk is sometimes used as a test of its purity, but since removing part of its fat in form of cream raises and adding water lowers the specific gravity, one form of adulteration may counteract and cover up the other, and thus render this test alone unreliable.

The flavor of milk is frequently affected by the food eaten by the cow. It is a familiar fact that turnips when fed to cows give a peculiar taste or flavor to the milk.

The milk of diseased cows may be very abnormal in composition and may be the means of conveying disease. It is well understood that milk can act as a carrier of infection, and it is therefore of the greatest importance that especial care be taken in the dairy to insure the cleanliness of milk and to render its exposure to any germs of infectious diseases or to impure air of any sort impossible. It should be possible in all large cities, as well as in the smaller cities and country towns, to obtain some assurance that the milk received comes from healthy animals and receives proper care and attention after being drawn from the cow. This assurance should be obtained either by the public authorities, by the employment of honest, reputable dealers, or by personal inspection and examination. The subject of the control and examination of the milk supply is treated at further length in Farmers' Bulletin No. 42 of this Department.¹

NUTRITIVE VALUE OF MILK.

Milk is peculiarly adapted for use as a food by man for several reasons. It contains all of the four classes of nutrients—protein, fats, carbohydrates, and mineral matter in more nearly the proper proportion to serve as a com-

¹ See also U. S. Department of Agriculture, Bureau of Animal Industry, Bulletin No. 20.

plete food than any other food material, although no one substance can furnish a complete food for an adult for reasons referred to beyond. It is in a form well adapted for various uses either alone or more especially in combination with other food substances and in the preparation of various dishes for the table. Its use is already considered indispensable in many such cases and it might profitably be used in many more. At the price ordinarily paid for milk in our large cities it is a food of reasonable cheapness, and at the prices prevailing in small cities and country towns it is an economical food.

DIGESTIBILITY OF MILK.

In general, milk ranks as a very digestible food, but when we come to speak more definitely as to its digestibility there are difficulties of two kinds. One of these has to do with what is understood by the term digestibility; the other has to do with the differences of different persons in respect to their powers of digestion.

By digestibility of food several things are, or may be, meant. One is the proportion of a given food material or of each of its several constituents which an ordinary person may digest. Another is the ease with which it is digested or the time required by the process. As the word is ordinarily used, however, it includes still another consideration, namely, whether the food material does or does not agree with the user.

Proportions of nutrients digested.—"We live not upon what we eat, but upon what we digest." In other words, the value of food for nutriment depends not only upon how much of the nutrients it contains, but upon how much of these the body actually digests and uses for its support. To put it in another way, the most important factor of digestibility, so far as the nutritive value of food is concerned, is found in the proportions of its different nutrients which can actually be digested by healthy persons and used for nourishment.

Considerable experimenting has been done upon this subject. While it is found that different people vary in the amounts which they can digest from the same food, the differences are not as great as might be supposed. The results in so far as they apply to milk alone, and in comparison with other food materials, may be briefly summarized as follows: The protein of milk, especially when it is used with other food materials, is quite readily and completely digested. In this respect it is like the protein of ordinary meats and fish. The protein of vegetable foods is much less completely digested. Thus, in potatoes and whole wheat and rye flour it may sometimes happen that as much as one-fourth of the protein may escape digestion and thus be useless for nourishment. From one-sixth to one-tenth of the protein of wheat flour, corn meal, beans and peas may in like manner be assumed to escape digestion, or rather to leave the body without being used for nutriment. These estimates assume that the materials are cooked and eaten in the usual way. Under the same circumstances, from nine-tenths to the whole of the protein of milk, meats and fish are assumed to be digested. The digestibility of the fats is likewise variable. Sometimes a large part of the fat of the food fails of digestion. In general it may be assumed that about 5 per cent of the fat of milk, meat, eggs, butter and lard, and a considerably larger proportion of the fats of some vegetable foods, will usually escape digestion. When, however, the diet contains

a very large amount of fat—for instance when it consists largely of fat meat—the digestion is less complete. One way in which the fat of ordinary foods is digested is by being made into an emulsion in the intestine. The fat of milk is an extremely fine emulsion and is thus in a sense “predigested” or in a partly digested form before it is taken into the stomach. This may help to explain why it is so easily digested.

The carbohydrates, which make up a large part of vegetable foods, are in general very digestible. Cane sugar is believed to be completely digested, and this is assumed to be the case with the sugar of milk.

The animal foods have in general the advantage of the vegetable foods in digestibility, in that they contain more protein and their protein is more digestible. Milk ranks among the most digestible of the animal foods in respect to all its ingredients.

The process of digestion.—When milk is taken into the stomach, it is speedily curdled by the action of the pepsin and acid of the gastric juice. When milk is eaten alone or in large quantities, the casein gathers in large lumps, which may be difficult of digestion by some. This is particularly the case with infants, and with adults whose digestion is weak, and is one of the reasons why milk should be used with other foods and not taken in large quantities alone. Human milk differs from cow's milk in the way in which it curdles when taken into the stomach. The casein of the former is not precipitated in such large lumps, but is more flocculent, and is thus more easily digested and does not cause irritation. This explains one reason why woman's milk is believed to be better than cow's milk for infants. The small flocculent particles of casein of the former are digested more easily, and do not produce the bad effects which sometimes come from the curdling of the latter. When cow's milk has been boiled before it is taken into the stomach, it is likely to be precipitated in more flocculent form. It is supposed by some chemists that when milk is boiled part of the phosphate of lime is precipitated, and that when the latter is thus removed the curd is more flocculent. It is also believed that lime tends to prevent the curdling of the casein in lumps, doing so both by neutralizing the acid and also by its intrinsic power of retarding coagulation. For this reason a little limewater is frequently added to milk that is to be fed to infants. For the same reason some adults of delicate digestion who find that fresh milk does not agree with them can use it with impunity if it has been boiled or if limewater is added.

In the processes of digestion and assimilation the different ingredients of the food undergo a great variety of chemical changes, and some of the compounds that are formed may be at times harmful in one way or another. Indeed, some of the compounds produced from the food in the body may be actually poisonous. Different persons are differently constituted with respect to these chemical changes which the food undergoes and the effects produced, so that it may be literally true that “one man's meat is another man's poison.” This is the case with milk. While for most people it is a very wholesome, digestible, and nutritious food, there are those who are made ill by drinking it. In like manner some people are made seriously ill by eating eggs, fruits, or other food materials.

Digestion v. utilization of food.—One important thing to remember is that the food which we digest is not always utilized to the best advantage. Different people differ greatly in this respect. One man may be able to do

a large amount of work and another very little, when both have the same diet and digest the same amount of nutrients from it. One person will grow fat upon an amount of digested material with which another will hardly hold his own. The getting of the most good from food is not so much a matter of digestion as of making use of what is digested.

All persons are alike in that they must have protein for the building and repair of the bodily machine, and fuel ingredients for warmth and work. But they differ widely in the amounts and proportions they require, even among those in good health.

For persons in good health and with good digestion there are two important rules to be observed in the regulation of the diet. The first is to choose the things which "agree" with them, and to avoid those which they can not digest and assimilate without harm. The second is to use such kinds and amounts of food as will supply all the nutrients the body needs and at the same time avoid burdening it with superfluous material to be disposed of at the cost of health and strength.

For guidance in this selection nature provides us with instinct, taste and experience. Physiological chemistry adds to these the knowledge—still new and far from adequate—of the composition of food and the laws of nutrition. In our actual practice of eating we are apt to be influenced too much by taste—that is, by the dictates of the palate; we are prone to let natural instinct be overruled by acquired appetite, and we neglect the teachings of experience. We need to observe our diet and its effects more carefully, and regulate appetite by reason. In doing this we may be greatly aided by the knowledge of what our food contains and how it serves its purpose in nutrition.

Effects of cooking.—Cooking changes the texture of a food material and affects its digestibility to a greater or less extent. In general it increases the digestibility of the vegetable food materials. This is true more especially of boiling or steaming. During the process of cooking, the cells of vegetables burst and the tissue of meat becomes softened and loosened, thus facilitating digestion by exposing them more fully to the action of the digestive juices.

In the case of milk the experience of different persons with cooked and uncooked milk is quite varied, and the results of the experiments upon the subjects are conflicting. The more common experience seems to indicate that cooking or heating the milk makes the proteids somewhat more difficult for some persons to digest, but there are exceptions to this rule, if it be a rule. For instance, as above stated, there are persons who cannot take fresh milk with comfort, but with whom boiled milk agrees very well.

SKIM MILK.

Even after average milk is skimmed it still contains nearly 10 per cent (one-tenth of its weight) of solids or nutritive ingredients. The amount of fat left in skim milk varies greatly with the method of creaming. Ordinary open shallow pan setting leaves anywhere from one-tenth to one-quarter of the original fat of the milk in the skim milk. Deep cold setting removes the fat much more completely, so that Cooley skim milk has from a trace to three-tenths or four-tenths of 1 per cent of fat. Separator skim milk has usually less fat than that from deep cold setting. It is not far out

of the way to say that a pound of skim milk contains 0.034 pound protein and has a fuel value of 170 calories or a little more protein than the same weight of whole milk and about one-half the fuel value.

At first thought it may be difficult to understand how removing the fat increases the amount of protein, but the explanation is simple. One pound of whole milk contains on the average 3.3 per cent or 0.033 pound of protein and 4 per cent or 0.04 pound of fat. If all the fat is removed, there will be left 0.96 pound of skim milk containing 0.033 pound of protein, or about 3.5 per cent, so that one pound of skim milk would contain about 0.035 pound of protein. For the same reason there is a slightly larger proportion of milk sugar in skim milk than in whole milk.

The value of skim milk as food is not generally appreciated. Taken by itself it is rather "thin" and, to use a common expression, "does not stay by." The reason for this is simple: One has to drink a large quantity to get the needed nourishment, and, further, is so readily disposed of that it does not satisfy the sense of hunger. But when taken with bread or used in cooking, it forms a very nutritious addition to the food. A pound of lean beef (round steak, for example) contains about 0.18 pound of protein and has a fuel value of 870 calories. Two and a half quarts, or five pounds, of skim milk will furnish nearly the same amount of protein and have about the same fuel value as the pound of round steak. Two quarts of skim milk has a greater nutritive value than a quart of oysters; the skim milk has 0.14 pound of protein and a fuel value of 680 calories, while the oysters contain only 0.12 pound of protein and have a fuel value of 470 calories. The nutriment in the form of oysters would cost from 30 to 50 cents, while the two quarts of skim milk would have a market value of from 4 to 6 cents and a value on the farm from 2 to 4 cents. An oyster stew made of one part oysters and two parts skim milk would owe its nutriment more to the milk than to the oysters. Bread made with skim milk would contain more protein than when made with water. A lunch or meal of bread and skim milk is very nutritious, as the following computation shows:

COMPOSITION AND COST OF A LUNCH OR MEAL OF BREAD AND SKIM MILK.

FOOD MATERIALS.	Amount.	Estimated cost.	Protein.	Fuel value.
		Cents.	Pounds.	Calories.
Bread.....	10 oz.	3	0.06	755
Skim milk.....	1 pt.	1	.03	170
Total.....	.....	4	.09	925

The commonly accepted standard for a man at ordinary muscular work calls for 0.28 pound of protein and a fuel value of 3,500 calories per day, so that the above lunch furnishes very nearly one-third of a day's nutriment and at a cost of but 4 cents. If whole milk were used instead of skim milk, the cost would be about 6 cents and the fuel value 1,080 calories, while the protein would remain the same in amount.

The following lunch, such as might be obtained in a restaurant or lunch room, will serve for the purpose of comparison:

ESTIMATED COST AND NUTRIENTS OF A RESTAURANT LUNCH.

FOOD MATERIALS.	Amount.	Estimated cost.	Protein.	Fuel value.
	Ounces.	Cents.	Pounds	Calories
Soup.....	8	.....	0.01	75
Beef	2	.....	.03	275
Potatoes.....	2	.....	.....	100
Turnips	1	.....	.....	15
Bread.....	4	.....	.03	300
Butter.....	$\frac{1}{2}$	.....	.....	100
Coffee:				
Milk	1	.....	.....	20
Sugar	$\frac{1}{2}$	.....	.....	55
Total.....	.....	15 to 20	.05	940

It will thus be seen that the 15-cent lunch containing nine different food materials did not have any greater nutritive value than the 4-cent lunch of bread and skim milk.

The ingredient of our food which costs the most, has the greatest physiological value, and is most apt to be lacking in ordinary dietaries, is protein. Skim milk has nearly all the protein of the whole milk. By the removal of the fat in the cream it loses half its fuel value, but practically none of the protein. What is left has all the value of the whole milk for building and repair of tissue, for the making of blood and muscle and bone, and half the value of whole milk for supplying heat and muscular power. When these facts are fully understood, skim milk will doubtless be more wisely utilized. The ways in which a skillful cook can utilize skim milk in cooking are almost endless, and the protein thus added to the daily ration is of the utmost importance.

CREAM.

When the globules of fat rise in the milk they entangle among them a considerable amount of milk, which is removed with the fat as cream. Cream is thus the butter fat of milk with some protein and carbohydrates, due to the intermixed milk, and contains on the average about four and one-half times the amount of fat contained in an equal volume of milk. The amount of protein and of carbohydrates is slightly less than in whole milk. The fuel value of a pint of cream is not far from 1,425 calories, or about the same as $1\frac{1}{2}$ pounds of bread, or $1\frac{1}{2}$ dozen bananas, or $4\frac{1}{2}$ pounds of potatoes. Four quarts of whole milk would not furnish quite as much energy (1,300 calories) but would increase the protein over six times. It is thus seen that cream is valuable chiefly for its heat-giving properties, and that the skim milk contains the valuable protein. When it is considered that a pint of cream retails at from 12 to 25 cents, and a pound of butter from 18 to 36 cents, and that the latter is worth two and a half times the former as a source of energy, it will be seen that cream is not, as a rule, an economical food.

BUTTERMILK.

Besides skim milk, there is another important by-product resulting from the manufacture of butter—namely, buttermilk. In many places this is used as a beverage to a considerable extent, and thus used furnishes more nutriment than almost any other beverage except whole milk and skim milk, unless it be cocoa and chocolate. To many persons buttermilk is much more palatable than whole milk or skim milk. The average composition of buttermilk is quite similar to that of skim milk, though it contains slightly less protein and sugar and a very little more fat. The fuel value is almost the same, about 165 calories per pint. An ordinary glass of buttermilk would contain as much nourishment as half a pint of oysters, or two ounces of bread, or a good-sized potato.

Buttermilk represents the milk that was entangled among the globules of fat as the cream was separated from the milk. During the manufacture of butter from cream the fat globules are brought together and removed, leaving the buttermilk. Buttermilk is thus seen to be practically the same thing as skim milk, only as a rule it is sour, owing to the cream being soured before churning.

NUTRITIVE VALUE OF MILK AS COMPARED WITH OTHER FOODS.

In the following table the amount and fuel value of the nutrients in a pound of whole milk, skim milk, and buttermilk are compared with the nutrients furnished by a pound of some other foods.

As compared with the animal foods, it will be noted from this table that milk contains carbohydrates and has no refuse. In these two respects it resembles more nearly many of the vegetable foods, such as flour, oatmeal, etc. The amount of mineral matter is much the same as in the other fresh substances given. There is a larger proportion of water in milk than in most other food materials, so that a given weight contains less dry matter or nutrients than most foods. It must be remembered, however, that the comparison is here made of a pint of milk with an equal weight of the other more condensed food materials without taking the price into consideration.

AMOUNTS OF NUTRIENTS IN A POUND (PINT) OF MILK AS COMPARED
WITH A POUND OF MEAT, BREAD, AND OTHER FOOD PRODUCTS.

FOOD MATERIALS.	Refuse.	EDIBLE PORTION.					Fuel value.
		Water.	NUTRIENTS.				
			Protein.	Fat.	Carbohy- drates.	Mineral matter.	
	Pound.	Pound.	Pound.	Pound.	Pound.	Pound.	Calories.
Milk (1 pint).							
Whole milk.....		0.87	0.03	0.04	0.05	0.01	325
Skim milk (0.3 per cent fat).....		.90	.04	.....	.05	.01	170
Buttermilk.....		.91	.03	.01	.05	.01	165
Other food materials (1 pound each).							
Cheese.....		.34	.26	.34	.02	.04	1,965
Butter.....		.11	.01	.85	.....	.03	2,605
Beef:							
Round.....	0.08	.61	.18	.12	.....	.01	870
Shoulder clod.....		.69	.19	.11	.....	.01	835
Sirloin.....	.13	.53	.16	.17	.....	.01	1,040
Fore quarter.....	.19	.50	.14	.16	.....	.01	950
Hind quarter ....	.16	.51	.15	.17	.....	.01	1,000
Mutton, side.....	.19	.43	.13	.24	.....	.01	1,275
Pork:							
Loin.....	.16	.44	.14	.25	.....	.01	1,240
Ham.....	.14	.35	.13	.34	.....	.04	1,655
Salt, fat.....		.07	.02	.87	.....	.04	3,715
Chicken.....	.35	.48	.15	.01	.....	.01	325
Codfish:							
Fresh.....	.80	.58	.11	.....	.....	.01	205
Salt.....	.25	.40	.16	.....	.....	.19	315
Mackerel, salt.....	.23	.38	.17	.17	.....	.10	1,050
Oysters, solids.....		.88	.06	.02	.03	.01	235
Wheat flour..		.12	.11	.01	.75	.01	1,645
Corn meal.....		.13	.09	.02	.75	.01	1,655
Oatmeal..		.07	.16	.07	.68	.02	1,360
Wheat bread.....		.35	.10	.01	.53	.01	1,205
Crackers.....		.08	.11	.10	.69	.02	1,895
Dried beans..		.13	.23	.02	.59	.04	1,500
Beets.....	.20	.70	.01	.....	.08	.01	170
Potatoes... ..	.15	.67	.02	.....	.15	.01	325
Turnips.....	.30	.62	.01	.....	.06	.01	135
Apples.....	.25	.62	.01	.....	.12	.....	255

If we wish to compare the food values of the actually nutritive ingredients (the dry matter contained in the edible portion) of different food materials, the calculations can be made on the basis of one pound of this water-free edible portion. This is an excellent method for comparing the actual values of two or more food materials as sources of protein or of energy. The following figures show the comparison of milk and a few other foods on this basis:

NUTRIENTS AND ENERGY IN ONE POUND OF THE WATER-FREE EDIBLE
PORTION OF SEVERAL FOOD MATERIALS.

FOOD MATERIALS.	Protein.	Fat.	Carbohy- drates.	Mineral matter.	Fuel value.
	Pound.	Pound.	Pound.	Pound.	Calories
Whole milk	0.25	0.81	0.89	0.05	2,475
Skim milk (0.3 per cent fat) .....	.36	.03	.55	.06	1,835
Buttermilk .....	.33	.06	.53	.08	1,845
Cheese.....	.39	.52	.03	.06	2,990
Beef, round.....	.57	.40	.....	.08	2,750
Smoked ham.....	.26	.66	.....	.08	2,275
Wheat flour.....	.13	.01	.85	.01	1,865
Wheat bread.....	.15	.02	.89	.01	1,865
Potatoes.....	.10	.01	.85	.04	1,790
Apples.....	.03	.03	.92	.02	1,885

It is seen from the above table that whole milk, skim milk, and butter-milk are all nitrogenous foods, though not as highly nitrogenous as the meats. Not only do they furnish a large proportion of nitrogen, but on account of their fuel ingredients (fats and carbohydrates) they are useful as sources of energy. One pound of dry substance of skim milk contains nearly three times the protein and very nearly the same fuel value as one pound of wheat flour. It is only on account of the large proportion of water that skim milk can not be used to a much greater extent than it is. Both skim milk and whole milk should, as has been urged above, be used much more extensively in cooking.

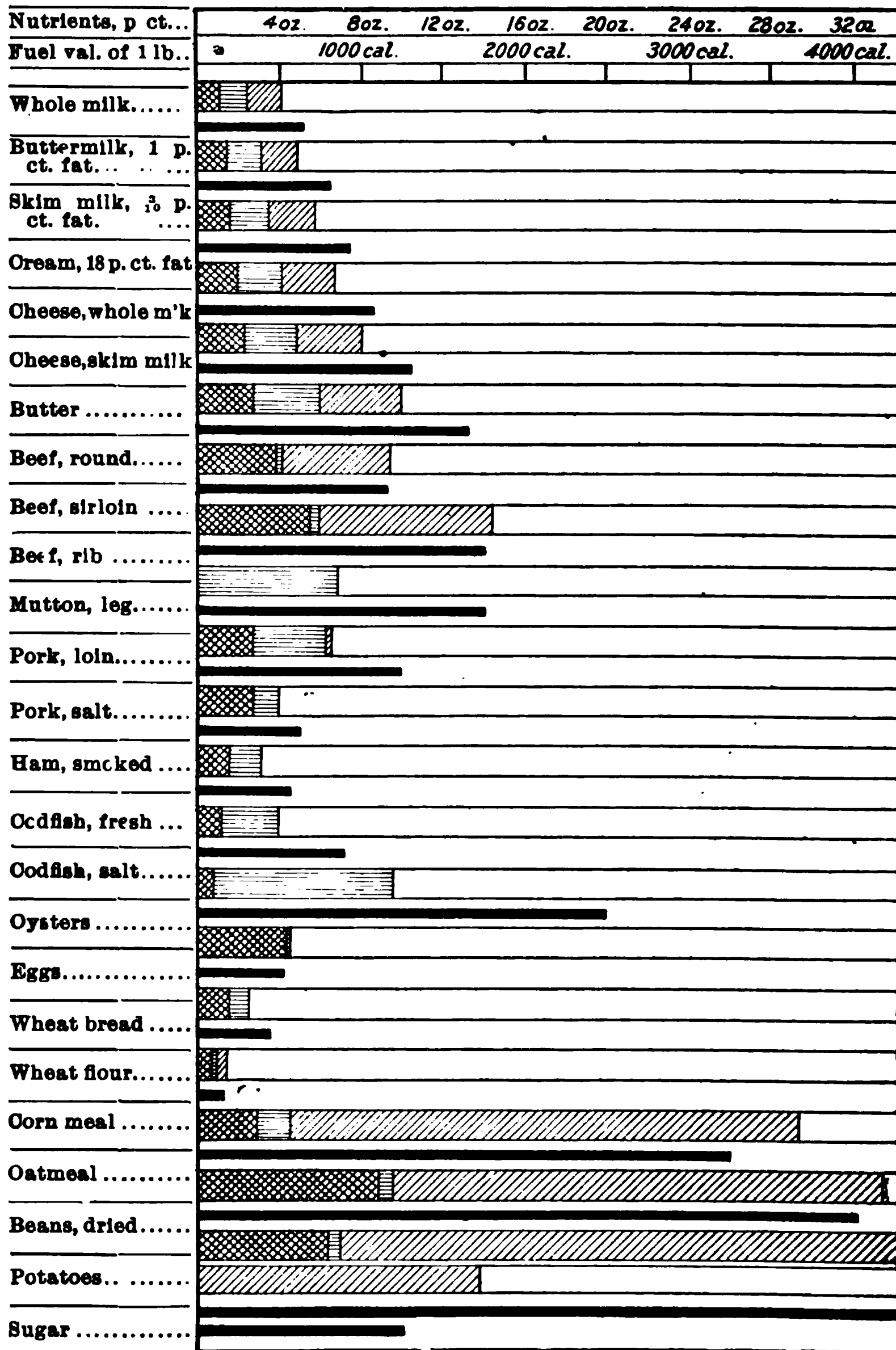
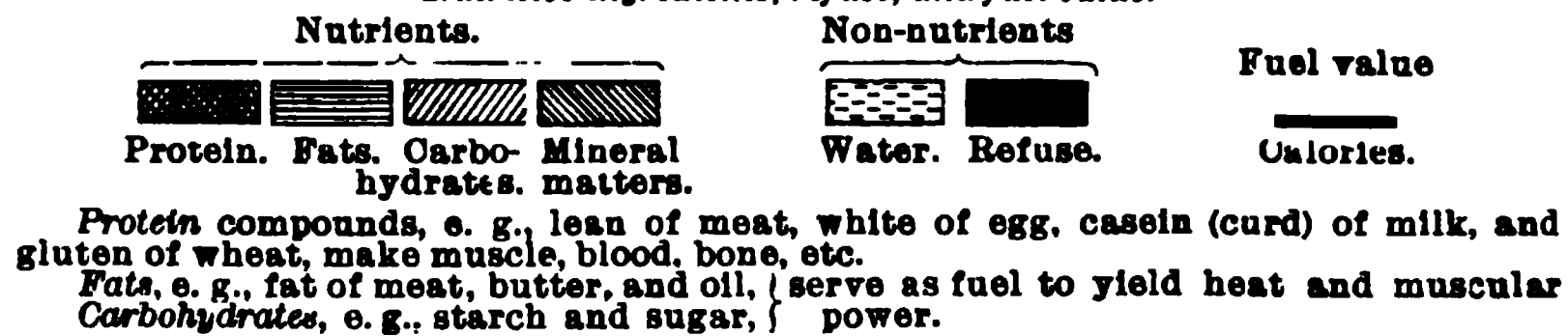
Chart I shows the relative composition of various foods as compared with whole and skim milk.

THE USE OF MILK WITH OTHER FOODS.

Milk is often spoken of as a "perfect food," but there are three reasons why it can not be considered a perfect food for adults. (1) The proportion of water is so large that great quantities would have to be consumed per day (from four to five quarts) in order to obtain the necessary nutrients. (2) The protein is present in rather large quantities as compared with the fats and carbohydrates. Thus the milk necessary to furnish the 0.28 pound of protein, estimated to be required by a laboring man per day, would only yield 2,700 calories fuel value, while milk in sufficient quantity to furnish the 3,500 calories fuel value estimated to be required would yield 0.35 pound of protein. (3) It is a well-recognized fact that the digestive functions require that the food shall have a certain bulk other than water. Cattle can not generally be maintained in health upon a condensed ration such as grain; they seem to require a certain distention of the stomach, such as is brought about by the fiber (cellulose or woody matter) of grass or hay. In like manner it seems desirable that man should have a certain amount of material in his food to produce distention or to promote peristaltic action of the intestines, or for other purposes not well understood.

CHART I.--COMPOSITION OF MILK AND OTHER FOOD MATERIALS.

Nutritive ingredients, refuse, and fuel value.



While milk alone can not be considered as a perfect diet, at least for healthy adults, it is of especial value as a food for invalids. It is as a rule, easily taken, easily digested, does not irritate the alimentary canal, and the diet is more readily under the control of the physician both as regards quantity and quality than when other foods are used. Life can be supported for a long period on milk alone.

Milk is a perfect food for the young of the species of animal producing the milk. Cow's milk is a perfect food for the new-born calf. Human milk is a perfect food for the new-born babe. Cow's milk is not, however, a perfect food for the human infant. One reason is that, as will be seen by reference to the table on page 283, woman's milk contains less protein and more milk sugar. Numerous explanations of the defects of cow's milk for the nutrition of infants are current, but the subject is hardly well enough understood to-day to warrant its discussion here.

While milk can not in itself be called a perfect food for adults, it is unusually well adapted for use in connection with other foods, either in its uncooked form or incorporated and cooked with other materials. In many culinary products it can be used instead of water. Bread mixed with milk should contain about one-tenth more protein and one-twentieth more fuel than bread mixed with water. The same thing is true of rolls, buns, etc. Milk is very generally used in many kinds of cake and pastry and in custards. Where desirable from economical reasons, or as a means of increasing the proportional amount of protein in a diet, skim milk can be advantageously substituted for whole milk.

A very interesting experiment was recently made at the University of Maine, in co-operation with this department,¹ in which the effect of a limited and unlimited amount of milk was tried at the university boarding house or "commons." From these studies the following conclusions were drawn: (1) The dietaries in which milk was more abundantly supplied were somewhat less costly than the others and at the same time were fully as acceptable; (2) the increased consumption of milk had the effect of materially increasing the proportion of protein in the diet; (3) the milk actually supplied the place of other food materials and did not, as many suppose, simply furnish an additional amount of food without diminishing the quantity of other materials; (4) the results indicate that milk should not be regarded as a luxury, but as an economical article of diet which families of moderate income may freely purchase as a probable means of improving the character of the diet and of cheapening the cost of the supply of animal foods.

NUTRITIVE VALUE OF MILK AND ITS COST.

A very valuable investigation on this subject has been lately made by the New Jersey Experiment Station in co-operation with the Department of Agriculture. Samples of milk as sold from the milk carts and by retail dealers at their stores in the cities of New Brunswick, Newark, Trenton, and Camden were collected by representatives of the station and analyzed. The price per quart in each case was noted. In a large number of instances inquiries were made among the dairies as to breed, feeding, and care of the cows. The handling of the milk by the dairymen and the wholesale and

¹See U. S. Dept. Agr., Office of Experiment Stations Bul. 37.

retail dealers was also noted. The following statements are based on the report of this investigation by Professor Voorhees,* of the New Jersey Agricultural Experiment Station.

Relative cost per pound of nutrients.—The fact that milk varies in composition shows at once that at a uniform price per quart there is a wide variation in the cost of the nutrients to the consumer. It will be observed from a study of the average composition of milk that as the total solids in the milk increase the percentage of fat is increased in greater proportion than the solids not fat. The consumer not only secures his total solids in the richer milk at a lower cost per pound, but also obtains a product which is very much richer in material to supply the body with the heat and muscular force. The facts regarding the variation in the cost and quality of the nutrients contained in milk show very clearly that the standard now in use as the basis of sale, viz., the quart, is illogical and unfair both to the consumer and to the producer of good milk. The dairyman who takes his milk to the creamery usually sells it on the basis of the amount of fat it contains, that is, the amount of fat is the measure of value. In like manner in the retailing of milk the fat content should be taken as a standard rather than the quart. For instance, the average fat content of a large number of milks examined for which at the average price of 8 cents per quart \$4 per hundred were paid, was, in round numbers, 4 per cent, or four pounds of fat per hundred pounds of milk. If milk containing 4 per cent of fat is worth 8 cents per quart, milk containing 3.5 per cent would, on the same basis, be worth 7 cents per quart, 3 per cent milk only 6 cents per quart, and 5 per cent milk 10 cents per quart. If the fat content standard were adopted the consumer would be protected in the sense that he would receive just what he paid for, and the producer of high quality product the advantage of a higher price, which fairly belongs to him, because of the greater cost of producing milk of a better quality. Inasmuch as this method of purchasing milk by actual composition is now used in many creameries with entire satisfaction both to the seller and the buyer, it should be entirely practicable under present conditions for even the smaller producers and dealers to guarantee a product containing a reasonably definite content of fat. Instruments are available for testing the fat content of milk which are inexpensive and simple in operation, and the chief causes of variation in the quality of milk under improved methods of feeding and management are well known and under the control of the dairyman. It remains for the more intelligent consumers and producers alike to demand that the system be adopted.

The use of the fat content as a standard, as above suggested, is the more reasonable, because (1) the fat is the most variable ingredient; (2) a milk rich in fat is generally more apt to be rich in other nutrients, and vice versa; and (3) the most common adulterations of milk reduce the proportions of fat either by skimming or by adding water.

On the other hand, the actual value of milk for nourishment does not depend wholly or chiefly upon the amount of fat. The protein and sugar are of equal importance. Indeed, in one respect the protein is the most valuable of all because it is the nutriment most apt to be deficient in our ordinary food. On this last account, indeed, the fat is of less consequence from the standpoint of general nutritive value than the protein.

* U. S. Dept. Agr., Office of Experiment Stations Bul. 35.

Comparison of milk and other food materials—Costs of nutrients.—In considering the relative values of any two food materials there are two principal factors to be taken into account—the protein content, and the fuel value. A definite comparison of the relative pecuniary economy of two or more foods must be made on the basis of the relative cost of the protein content and also on that of the fuel value. Between these two bases we can have no fixed ratio. The following table shows the amount of whole milk, or of skim milk, necessary to furnish the protein and energy equivalent to that contained in one pound of each of a number of different food materials:

Cost of nutrients in milk as compared with other food materials.

FOOD MATERIALS.	WHOLE MILK.		SKIM MILK.	
	Amount.	Cost at 6 cents per quart.	Amount.	Cost at 3 cents per quart.
One pound of—	Quarts.	Cents.	Quarts.	Cents.
Beef—				
Round furnishes protein equivalent to	2.7	16	2.7	8
Round furnishes fuel value equivalent to	1.3	8	2.6	8
Shoulder clod furnishes protein equivalent to	2.9	17	2.9	9
Shoulder clod furnishes fuel value equivalent to	1.2	7	2.5	7
Sirloin furnishes protein equivalent to	2.4	14	2.4	7
Sirloin furnishes fuel value equivalent to	1.6	10	3.2	10
Mutton loin furnishes protein equivalent to	2.0	12	2.0	6
Mutton loin furnishes fuel value equivalent to	2.2	13	4.4	13
Pork—				
Fresh, furnishes protein equivalent to	2.1	13	2.1	6
Fresh, furnishes fuel value equivalent to	2.1	13	4.1	12
Salt: Fat furnishes protein equivalent to	2.3	2	.8	1
Salt: Fat furnishes fuel value equivalent to	5.7	34	11.3	34
Smoked ham furnishes protein equivalent to	2.0	12	2.0	6
Smoked ham furnishes fuel value equivalent to	2.5	15	5.0	15
Chicken furnishes protein equivalent to	2.2	13	2.2	7
Chicken furnishes fuel value equivalent to .....	.5	3	1.0	3
Salt cod furnishes protein equivalent to	2.4	14	2.4	7
Salt cod furnishes fuel value equivalent to .....	.5	3	1.0	3
Oysters, "solid," furnishes protein equivalent to	1.9	11	1.9	6
Oysters, "solid," furnishes fuel value equivalent to .....	.4	2	.7	2
Wheat flour furnishes protein equivalent to	1.7	10	1.7	5
Wheat flour furnishes fuel value equivalent to	2.5	15	5.0	15
Wheat bread furnishes protein equivalent to	1.4	8	1.4	4
Wheat bread furnishes fuel value equivalent to	1.9	11	3.7	11
Beans, dried, furnishes protein equivalent to	3.3	20	3.3	10
Beans, dried, furnishes fuel value equivalent to	2.4	14	4.8	14
Potatoes furnishes protein equivalent to .....	.3	2	.3	1
Potatoes furnishes fuel value equivalent to .....	.5	3	1.0	3
Turnips furnishes protein equivalent to .....	.2	1	.2	1
Turnips furnishes fuel value equivalent to .....	.2	1	.4	1

The quantity of milk in the above table is given in quarts and tenths of a quart. It is probable that 6 cents a quart for whole milk and 3 cents a quart for skim milk, the prices assumed in the table, represent as nearly the average retail prices paid by consumers as any rate that could be taken. Of course many pay much more and others much less than 6 cents a quart for whole milk. For those who pay more or less, the actual cost of the milk equivalent to the protein or fuel value of one pound of any of the foods enumerated is easily calculated by multiplying the equivalent number of quarts of milk by the price paid per quart. This table shows that one pound of sirloin steak (costing from 16 to 22 cents) contains the same

amount of protein that would be obtained in 2.4 quarts of whole milk costing, at 6 cents a quart, 14 cents, and the same fuel value that would be obtained in 1.6 quarts of whole milk costing 10 cents. Skim milk would furnish the energy at the same price as the whole milk, but the protein would cost only half as much as when furnished by whole milk.

Whole milk and skim milk contain practically the same amount of protein, but the former costs at least twice as much per quart. As a source of protein, therefore, skim milk is twice as economical as whole milk. On the other hand, the fuel value of skim milk is practically but one-half that of whole milk, so that a given amount of energy is furnished for the same price, either in whole milk or skim milk.

From the above table it will be seen that 16 cents' worth of whole milk or 8 cents' worth of skim milk would furnish the same amount of protein as would be obtained in one pound of beef round, while the corresponding fuel value would be obtained in 8 cents' worth of either kind of milk. Compared with round steak at from 12 to 16 cents a pound the whole milk certainly is as economical and skim milk a more economical food material. The same point is illustrated with other animal foods, especially with those whose chief value lies in their content of protein. Milk can not, however, be substituted in place of an essentially energy-yielding food, such as salt fat pork.

The cereal foods, wheat flour, and other flours, bread, crackers, etc., as also beans and peas, are a much cheaper source of nutrients than milk. It is, however, impracticable to live altogether on these foods even if economical reasons should make it desirable. Some other foods are necessary, and among these milk is one of the best and as a rule one of the most economical.

Chart II shows the quantities of nutrients obtained in 10 cents' worth of whole and of skim milk, at different prices per quart, as compared with 10 cents' worth of other food materials at common prices.

DAILY MENUS CONTAINING MILK.

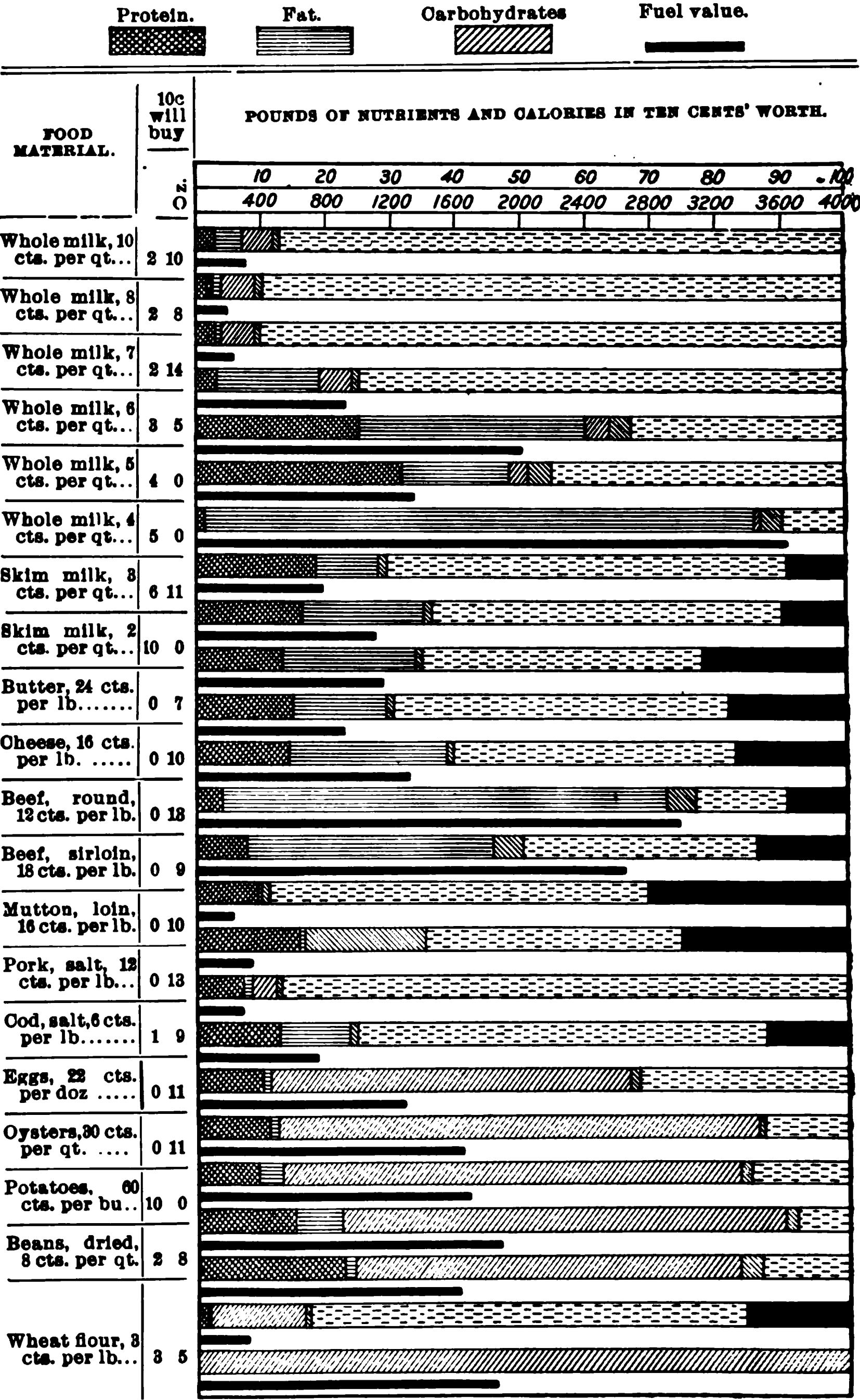
Dietary standards.—In order that food shall be adapted to the needs of the body, it should have the protein and fuel ingredients in the proper proportions. It has been assumed from the most accurate observations available that an average man doing an ordinary amount of manual labor—a carpenter or mason, for instance—requires in his daily food about 0.28 of a pound of protein, and in addition enough fats and carbohydrates to make the fuel value 3,500 calories. Men in professional life, with less muscular work, generally need less. Standards prepared for men of this class call for 0.22 to 0.25 of a pound of protein and from 2,700 to 3,000 calories of energy. Various combinations of foods for daily dietaries on either of the bases noted above may be made by using calculations based on the chemical composition of various foods. A few such calculations are here given in the form of daily menus which give the actual amounts of different food materials thus required by a family equivalent to four men at ordinary manual labor.

Such a family might, for example, consist of a mechanic and wife with four children—two girls of 12 and 6 and two boys of 10 and 8 years, respectively. Here it would be assumed that the man was engaged at moderately

hard manual work. In like manner the family might consist of a man of sedentary occupation—a bookkeeper, for example—his wife, three children of 11, 9 and 6 years, and a female servant. Estimated in the same way, a day laborer's family, consisting of a father and mother with three children of 1, 3 and 6 years of age, would be equivalent to three men at active work, and would require three-fourths of the quantities in the following menus.

The equivalent of any family in terms of one adult man at moderate work one day can be easily calculated by the use of the following factors, which are based in part upon experimental data and in part upon arbitrary assumption. While these factors do not represent the proportional amount consumed by every child of a given age, they are probably on the whole as nearly accurate as can be obtained without considerable more experimental data. The factors are as follows:

CHART II.—PECUNIARY ECONOMY OF MILK AND OTHER FOODS.
AMOUNTS OF ACTUAL NUTRIENTS OBTAINED IN DIFFERENT FOOD MATERI-
ALS FOR TEN CENTS.



A woman requires about 0.8 the food of a man.*

A boy 14 to 16 years old requires about 0.8 the food of a man.

A girl 14 to 16 years old requires about 0.7 the food of a man.

A child 10 to 13 years old requires about 0.6 the food of a man.

A child 6 to 9 years old requires about 0.5 the food of a man.

A child 3 to 5 years old requires about 0.4 the food of a man.

A child under 2 years old requires about 0.3 the food of a man.

The menus.—To illustrate the ways in which milk may be combined with other food materials to form daily dietaries with about the amount of protein and the fuel value called for by the standard for men of moderate muscular work, a few menus are given in the following pages. These menus are intended to show how approximately the same nutritive value may be obtained by food combinations differing widely as regards the number, kind, and price of the food materials used to make up three daily meals. They also illustrate how the cost of the daily menu may vary greatly with the kind and variety of materials purchased though the nutritive value remains the same. These sample menus should not, however, be regarded as in any sense "models" to be followed in actual practice. The daily menus for any family will necessarily vary with the market supply, the season, and the relative expensiveness of different food materials, as well as with the tastes and purse of the consumers. The point to which we wish here to draw especial attention is that the prudent buyer of foods for family consumption can not afford to wholly neglect their nutritive value in making such purchases.

With reference to the following daily menus several points must be definitely borne in mind. (1) The amounts given represent about what would be called for in a family equivalent to four full-grown men at ordinary manual labor, such as machinists, carpenters, mill-workers, farmers, truckmen, etc., according to the usual accepted standards. Sedentary people would require somewhat less than the amounts here given. (2) Children as a rule may be considered as having "moderate muscular exercise," and it may be easily understood that the 14-year-old boy eats as much as his father who is engaged in business or professional occupation, both requiring, according to the tentative standard, 0.8 of the food needed by a man with moderate muscular work. (3) It is not assumed that any housewife will find it convenient to follow exactly the proportions suggested in the menus. The purpose is to show her about what amounts and proportions of food materials would give the required nutrients.

Menu I calls for a daily expenditure of 41½ cents per person, the heaviest items of expense therein being the bacon and eggs, the sirup, the lamb, and the chicken croquettes. It is, perhaps, more elaborate and costly than many families would desire. The detailed menu is as follows:

*These comparisons are with a man at moderate muscular work. A man without any considerable muscular exercise might require only the eighth-tenths here allotted to a woman engaged in ordinary household duties, or a boy from 14 to 16 years old at school.

MENU I.—For family equivalent to 4 men at moderate muscular work.

FOOD MATERIALS.	Weight.		Cost.	Protein.	Fuel value.
	Lbs.	Oz.	Cents.	Pounds.	Calories.
<i>Breakfast.</i>					
Cereal, oatmeal.	0	3	2½	0 099	350
Milk		8		.012	64
Sugar		2		.....	232
Bacon		8	8	.046	1,300
Eggs, 4		8	8	.065	222
Baked potatoes	1	0	1½	.018	325
Buckwheat cakes, prepared buckwheat....		8	4	.034	780
Maple sirup		4	3	.....	227
Bread		8	2	.048	603
Butter*	1½		3	.....	225
Coffee†.....			3½	.010	410
Total.			35½	.262	5,028
<i>Dinner.</i>					
Bouillon ..	1	0	15	.020	45
Roast lamb, leg.....	1	8	30	.228	1,282
Mashed potatoes.....	1	0	2	.018	325
Cucumbers	1	0	3	.009	52
Green peas, shelled.	1	8	6	.072	383
Macaroni		4	4	.029	410
Cheese ..		3	3	.019	200
Fruit pudding:					
1 cup flour		4	9	.028	410
Sugar		4		.....	405
1 egg		2		.016	81
½ cup milk		4	5	.008	81
1 cup fruit.		8		.012	817
Foamy sauce for pudding:					
1 egg..		2	5	.016	81
½ cup of milk.....		4		.010	102
½ cup of sugar.....		4		.....	405
Bread		6	1½	.036	452
Butter.....		1	2	.....	217
Tea or coffee			3½	.010	410
Total.....			84	.562	6,446
<i>Supper or lunch.</i>					
Chicken croquettes:					
Chicken meat.....		8	18	.114	250
Flour.		1		.007	102
Onions		1		.001	13
1 egg.....		2	3	.016	81
Bread		2		.012	151
Lettuce		8	3	.005	42
Bread.....		8	2	.048	603
Butter.....	1½		3	.....	225
Cake.....		6	3	.026	619
Berries.....	1	0	8	.010	175
Chocolate or coc'a, with milk and sug'r, cr'm	1½		5	.030	625
Total.....			42	.269	2,987
Total per day.....			161½	1 093	14,461
Total for one man.....			40	.270	3,615

*The figures given for butter in these menus are based on the percentage composition as given in U. S. Dept. Agr. office of Experiment stations, Bul. 28. This differs slightly from that given on page 15, which is a recently made average of a larger number of analyses.

†The values given under coffee include in all cases the milk and cream and the sugar that would probably be used therein.

A family equivalent to four men having little muscular exercise—i. e., men with sedentary occupation—would require but about 0.8 the quantities indicated in the above menu. It would be very doubtful, however, if they would eat proportionally less of every food material. It would, in fact, be more probable that the amounts of meat, fish, eggs, potatoes and bread eaten would be reduced to a much greater amount than fruit, pastry, coffee, etc.

Menu I modified so as to furnish the amount of nutrients required by a family equivalent to four adults with little muscular exercise would be as follows:

Breakfast.—Cereal, 2½ ounces; milk, 6 ounces; sugar, 2 ounces; bacon, 6 ounces; potatoes, 12 ounces; buckwheat, prepared, 6 ounces; maple syrup, 3 ounces; other items as in Menu I.

Dinner.—Roast lamb, leg, 1 pound 4 ounces; green peas, shelled, 1 pound 4 ounces; macaroni, 3 ounces; cheese, 2 ounces; other items as in Menu I.

Supper.—Chicken croquettes, chicken meat, 6 ounces; flour, ½ ounce; onion, ½ ounce; butter, 1½ ounces; lettuce, 6 ounces; bread, 6 ounces; other items as in Menu I.

By reducing the materials in this menu to the quantities noted above, the average cost of the three meals would be about 37 cents per man, and would furnish not far from 0.24 pound protein and a fuel value of about 3,090 calories to each person.

In Menu II the day's food costs 29½ cents. The largest single item is the meat for dinner. The one giving the least food return in actual nutriment for its cost is the fruit. The amount of protein furnished by the breakfast and supper is small as compared with the fuel value of the food. Consequently, for dinner some meat is used which will furnish considerable protein, but not an excessive amount of fuel ingredients, otherwise the ration will be one-sided. Beef, veal and fish are meats giving a large amount of protein as compared with the fuel value, and it is from one of these classes that the meat is to be selected. The choice might fall on a knuckle of veal for a stew, fried fresh cod, or some lean cut of beef. In this menu the shoulder of beef is chosen. This, when properly boiled, gives a meat very tender, juicy, and palatable; when improperly cooked it adds more odium to the very unjustly despised "beef stew" and "pot roast." If desired, a veal shoulder roast may be substituted. It would require 2½ pounds of this to replace the beef shoulder, and would cost about 30 cents at the rates here assumed. This would make the cost per person about 31 cents for the day.

The details of this menu are as follows:

MENU II.—For family equivalent to 4 men at moderate muscular work.

FOOD MATERIALS.	Weight.	Cost.	Protein.	Fuel value.
	Lbs. Oz.	Cents.	Protein.	Calories.
<i>Breakfast.</i>				
Bananas, 4.....	0 12	6	0.005	217
Cereal, oatmeal.....	2	3	.019	232
Milk.....	8		.016	162
Sugar.....	2		.....	232
Ham (in omelet).	2	3	.016	207
Eggs, 4.....	8	9	.065	322
Bread.....	1 0	4	.096	1,206
Butter.....	2½	5	.....	542
Coffee.....	.....	5	.015	615
Total.....	.....	35	.232	3,735
<i>Dinner.</i>				
Boiled beef, shoulder.....	2 0	24	.886	1,670
Potatoes.....	1 12	2	.031	569
Green peas *.....	1 12	6	.030	350
Butter.....	1½		.....	380
Bread pudding:				
Bread.....	4	10	.024	301
Milk.....	1 8		.049	497
1 egg.....	2		.016	81
Sugar.....	3		.....	350
Butter.....	¼	3	.....	108
Bread.....	12		.071	904
Butter.....	1½	3	.....	325
Cheese.....	2	2	.032	246
Coffee.....	.....	5	.015	615
Total.....	.....	55	.663	6,386
<i>Supper or lunch.</i>				
Mutton chops, shoulder.....	10	10	.084	682
Fried potatoes:				
Potatoes.....	10	2	.011	203
Lard.....	¼		.....	132
Rolls:				
3 cups flour.....	12	8	.085	1,230
1 egg.....	2		.016	81
Butter.....	1		.....	217
Stewed apples:				
Apples.....	12	3	.003	191
Sugar.....	3		.....	350
Oake.....	4	2	.017	413
Tea or coffee.....	.....	3½	.010	410
Total.....	.....	28½	.226	2,906
Total per day.....	.....	118½	1.131	14,029
Total for one man.....	.....	29½	.280	3,507

*Weight with pods.

It is customary in very many families to make some additional preparation for the Sunday table. In the following menu is given a rather more elaborate and varied diet, such as might be prepared for Sunday. The estimated cost per man per day of this ration is 46 cents, the chief items being the fruit, chicken, and ice cream. The details of this menu are as follows:

Menu III.—For family equivalent to 4 men at moderate muscular work.

FOOD MATERIALS.	Weight.	Cost.	Protein.	Fuel value.
	Lbs. Oz.	Cents.	Pounds.	Calories.
<i>Breakfast.</i>				
Oranges, 4	1 8	10	0.009	480
Cereals, wheat preparation... ..	4	2	.031	421
Milk.....	4		.008	81
Sugar.....	2			284
Fried perch:				
Perch.....	1 0	8	.072	195
Lard.....	¼			66
Oyster fritters:				
¼ pint oysters.....	8	11	.031	117
¼ pint milk.. ..	8		.016	162
1 cup flour	4		.028	410
Creamed potatoes:				
1 pint potatoes	1 0	5	.018	325
1 pint milk.....	8		.016	162
Butter.. ..	1			219
Corn meal muffins:				
1 cup corn meal	6	4½	.033	621
¼ cup flour	2		.014	205
Sugar.....	1			117
1 egg.....	2		.016	81
1½ cups milk	10		.021	203
Butter	2	4		434
Coffee or tea.....		5	.015	615
Total.....		49½	.328	5,148
<i>Dinner.</i>				
Roast chicken:				
Chicken.....	2 8	40	.370	812
Bread	4		.024	301
Butter	¼			108
Onion	1		.001	12
Rice croquettes:				
Rice.....	4	4	.020	407
1 egg.....	2		.016	81
Sugar	½			58
Mashed potatoes.....	8	1	.009	162
Baked sweet potatoes.....	8	1	.007	240
Boiled onions	6	1	.006	79
Cranberry sauce:				
Cranberries.....	8	4	.003	112
Sugar	4			465
Celery.....	8	2	.007	43
Bread	4	1	.024	301
Butter.....	1	2		219
Ice cream, 1 pint	1 0	25	.025	910
Cake.....	4	2	.017	412
Fruit.....	1 0	5	.010	160
Coffee or tea.....		7	.020	820
Total.....		95	.559	5,704
<i>Supper or lunch.</i>				
Potato salad:				
Potato	1 0	2	.018	325
Onion	1		.001	12
Oil.....	¼			66
Cold tongue	8	18	.108	690
Bread	12	3	.071	904
Butter	2	4		434
Cheese	2	2	.022	246
Fruit.....	12	6	.005	217
Coffee or tea.....		3½	.010	410
Total		88½	.245	3,305
Total per day		183	1.132	14,157
Total for one man		46	.280	3,540

In the fourth menu the daily food costs about 26 cents per man. Skim milk is introduced as a beverage for supper instead of tea or coffee. In this way a ration, which would otherwise be slightly deficient in protein, is supplied with the required amount, with the addition of but very little of fats and carbohydrates, i. e., fuel ingredients. It will be found that the general tendency in the diet, especially where there is a considerable variety of pastry and desserts, is toward too large a proportion of fats and carbohydrates as compared with the protein. This can be obviated either by the use of more and leaner meats, fish, beans, skim milk or buttermilk, and cheese.

MENU IV.—For family equivalent to 4 men at moderate muscular work.

FOOD MATERIALS.	Weight.		Cost.	Protein.	Fuel value.
	Lbs.	Oz.	Cents.	Pounds.	Calories.
<i>Breakfast.</i>					
Baked apples.....	2	0	2	0.008	510
Boiled hominy.....		8	4½	.041	823
Milk.....		10		.020	202
Sugar.....		3		.....	350
Broiled sirloin.....		10	11	.099	650
Potatoes.....		8	1	.009	162
Muffins—					
1 egg.....		4	5	.032	162
3 cups flour.....		8		.057	820
Butter.....		2	4	.....	435
Coffee.....			3½	.010	410
Total.....			31	.276	4,524
<i>Dinner.</i>					
Tomato soup.....	2	0	6	.036	370
Veal stew, shoulder.....	2	0	20	.832	1,350
Potatoes.....	3	0	4½	.054	975
Apple dumpling—					
1 egg.....		2	8	.016	81
4 apples.....	1	8		.006	382
½ cup lard.....		4		.....	1,055
1 cup flour.....		4		.028	410
Sauce for dumpling.....					
Butter.....		1	3	.....	217
Sugar.....		4		.....	465
Bread.....		12	3	.071	904
Butter.....		1	2	.....	217
Coffee or tea.....			3½	.010	410
Total.....			50	.563	6,836
<i>Supper or lunch.</i>					
Dried canned corned beef.....		8	6	.142	560
Potato croquette.....		8	1	.009	162
Biscuit.....		12	4	.076	1,297
Butter.....		1½	3	.....	325
Oranges, 4.....	1	4	7	.007	400
Skim milk.....	1	6	2	.046	234
Total.....			23	.274	2,978
Total for day.....			104	1.103	14,338
Total for one man.....			26	.275	3,585

In illustration of what was said above concerning the tendency of a varied ration to contain too large a proportion of fuel ingredients (fats, starch, sugar, etc.) as compared with the amount of protein, the following

menu may be cited (No. 5). The changes necessary to obtain the desired proportions are illustrated in menu No. 6.

It is, of course, not important that each meal, or the total food of each individual day, should have just the right amount of nutrients, or that the proportions of protein and fuel ingredients should be exactly correct so as to make the meal or day's diet well balanced. The body is continually storing nutritive materials and using them. It is not dependent any day upon the food eaten that particular day. Hence an excess one day may be made up by a deficiency the next or vice versa. Healthful nourishment requires simply that the nutriments as a whole, during longer or shorter periods, should be fitted to the actual needs of the body for use.

MENU V.—For family equivalent to 4 men at moderate muscular work.

FOOD MATERIALS.	Weight.	Cost.	Protein.	Fuel value.
	Lbs. Oz.	Cents.	Pounds.	Calories.
<i>Breakfast.</i>				
Bananas, 4 (or grapes, 1 pound).....	1 4	6½	.009	363
Breakfast cereal.....	4	8	.081	421
Milk.....	6		.012	122
Sugar.....	2		.....	232
Mutton chops.....	1 4	20	.165	1,812
Potatoes.....	1 0	1½	.018	325
Butter.....	8	6	.....	653
Eggs.....	12	4	.077	1,148
Coffee.....	.....	3½	.010	410
Total.....	.....	44½	.323	5,485
<i>Dinner.</i>				
Tomato soup.....	2 0	12	.086	370
Roast pork.....	2 8	33	.258	3,850
Potatoes.....	1 4	1½	.022	408
Turnips.....	8	1	.005	67
Tapioca pudding:				
Tapioca.....	1 3	7	.001	310
Apples.....	1 0		.004	255
Sugar.....	2		.....	232
Cream.....	4	3½	.006	228
Coffee.....	.....		.010	410
Total.....	.....	57	.427	5,628
<i>Supper.</i>				
Milk toast:				
Milk.....	2 0	18	.066	650
Bread.....	1 2		.107	1,856
Butter.....	4		.....	809
Cornstarch.....	2	6	.....	228
Sliced cold pork.....	8		.071	670
Fried potatoes:				
Potatoes.....	8	1	.009	163
Lard.....	½		.....	133
Cake.....	6	4	.036	619
Coffee or tea.....	.....	3½	.010	410
Total..	.....	33½	.259	5,096
Total for day.....	.....	134	1.048	16,209
Total for one man.....	.....	33½	.262	4,053

MENU VI—For family equivalent to 4 men at moderate muscular work,

FOOD MATERIALS.	Weight.	Cost.	Protein.	Fuel value.
	Lbs. Oz.	Cents.	Pounds.	Calories.
<i>Breakfast.</i>				
Bananas 4 (or grapes, 1 pound).....	1 4	6½	0.009	362
Breakfast cereal.....	4	8	.031	421
Milk	8		.016	162
Sugar.....	1½		.....	175
Veal cutlets.....	1 0	20	.200	775
Potatoes.....	1 0	1½	.018	325
Butter.....	2	6	.....	653
Rolls.....	12	4	.077	1,148
Coffee.....	.....	3½	.010	410
Total.....	.....	44½	.361	4,431
<i>Dinner.</i>				
Pea soup:				
Split peas.....	8	5	.121	820
Butter.....	1		.....	217
Flour.....	1		.007	108
Roast beef, chuck rib.	1 12	21	.275	1,260
Potatoes.....	1 4	1½	.022	406
Turnips.....	8	1	.005	67
Oottage pudding with lemon sauce:				
1 cup flour.....	4	6½	.028	410
Sugar.....	3		.....	350
Butter.....	1½		.....	325
1 cup milk.....	8	2½	.016	162
Sugar....	4		.....	465
Cornstarch	1½		.....	172
Butter.....	½	3½	.....	108
Coffee.....	.....		.010	410
Total.....	.....	41	.484	5,275
<i>Supper.</i>				
Milk toast:				
Milk.....	2 0	18	.066	650
Bread.....	1 2		.107	1,356
Butter.....	4		.....	800
Cornstarch	2	8	.....	228
Canned salmon.....	8		.098	840
Fried potatoes:				
Potatoes.....	8	1	.009	162
Lard.....	½		.....	132
Oake	6	4	.026	619
Coffee or tea.....	.....	3½	.010	410
Total.....	.....	34½	.816	4,766
Total for day.....	.....	120	1.161	14,472
Total for one man .....	.....	30	.290	3,618

In Menu VII the cost per day amounts to 21 cents, the protein to 0.28½ pound, and the fuel value to 3,410 calories. This ration is slightly deficient in fuel ingredients—those which supply the body with heat and muscular force—and would best precede or follow one in which fatter meats and more pastry were used, such, for example, as Menu V. If desired, the Indian pudding could be made with whole milk instead of skim milk, when the fuel value per person would be increased to 3,500 calories without affecting the amount of protein, while the cost per man would be increased about 1 cent. In this case the ration becomes well balanced in itself.

MENU VII.—For family equivalent to 4 men at moderate muscular work.

FOOD MATERIALS.	Weight.	Cost.	Protein.	Fuel value.
	Lbs. Oz.	Cents.	Pounds.	Calories.
<i>Breakfast.</i>				
Oatmeal	0 2	2	0.019	232
Milk	6 ½		.012	122
Sugar	1		.....	175
Fresh pork sausage.....	1 8	18	.192	3,265
Potatoes.....	12	1	.013	244
Bread.....	12	3	.071	904
Butter	2	4	.....	434
Coffee.....	.....	3 ½	.010	410
Total.....	.....	31 ½	.317	5,776
<i>Dinner.</i>				
Beef, for stew	2 8	15	.347	1,900
Potatoes.....	1 8	2	.027	487
Turnips.....	8	1	.005	67
Bread	8	2	.048	608
Butter	1	2	.....	217
Indian pudding:				
Corn meal.....	4	6	.022	414
Molasses.....	4		.007	329
Butter	½		.....	108
Skim milk.....	2 0	3 ½	.068	840
Coffee.....	.....		.010	410
Total.....	.....	31 ½	.534	4,875
<i>Supper.</i>				
Corned beef hash:				
Corned beef, canned.....	8	6	.142	560
Potatoes.....	8	1	.009	162
Bread.....	12	3	.071	904
Butter.....	2	4	.....	434
Apples.....	12	1	.003	191
Milk.....	2 0	6	.066	725
Total.....	.....	21	.291	2,976
Total per day.....	.....	84	1.142	13,627
Total for one man. ....	.....	21	.285	3,407

In these menus the amount of milk has, as a rule, been taken as representing somewhere near the average consumption. The amount of milk can be increased in any of the menus given above either by substituting it to some extent for coffee or tea, or by using more milk and smaller quantities of meats, butter, or eggs. Roughly speaking, one quart of whole milk could be substituted for half a pound of meat or eggs and the amount of nutrients would be the same, while a pint of milk would give as large a fuel value as one and one-half ounces of butter, and in addition considerable protein not furnished by the latter.

This replacement of meats by milk is illustrated in the following menu, in which a diet with a rather small quantity of milk is so changed as to include a much larger amount. Thus for breakfast in the modified ration a pint and a half of milk is made to take the place of half a pound of broiled steak. For dinner a quart of skim milk (or buttermilk) is called for, or a glass for each person unless some of it is used in the cooking. At the same time, four ounces less roast pork is required. In the same way a glass of

whole milk is allowed each person for supper, or the bread can be made into milk toast and the most of the extra milk used in this way. This allows the canned salmon to be reduced six ounces.

MENU VIII.—For family equivalent to 4 men at moderate exercise.

FOOD MATERIALS.	WEIGHT OF FOOD.		FOOD MATERIALS.	WEIGHT OF FOOD.	
	With small amount of milk.	With large amount of milk.		With small amount of milk.	With large amount of milk.
<i>Breakfast.</i>			<i>Dinner—Continued.</i>		
	<i>Lbs. Oz.</i>	<i>Lbs. Oz.</i>		<i>Lbs. Oz.</i>	<i>Lbs. Oz.</i>
Bananas, apples or pears	0 12	0 12	Apple fritters—Con'td.		
Wheat preparation.....	4	4	Flour.....	2	2
Milk.....	8	8	1 egg.....	2	2
Sugar.....	2	2	Lard.....	1½	1½
Broiled sirloin steak.....	1 4	12	Bread.....	8	8
Baked potatoes.....	1 8	1 8	Butter.....	2	2
Hot rolls.....	1 0	1 0	Extra skim milk.....		2 0
Butter.....	2½	2½	<i>Supper.</i>		
Extra milk.....		1 8	Canned salmon.....	1 6	1 0
<i>Dinner.</i>			Potatoes.....	12	12
Tomato soup.....	1 12	1 12	Bread.....	8	8
Roast pork.....	1 12	1 8	Butter.....	2	2
Mashed potatoes.....	1 4	1 4	Berries, canned or fresh.	8	8
Turnips.....	8	8	Extra milk.....		2 0
Apple fritters:					
Apples.....	8	8			

Cost, protein, and fuel value of the above.

	Cost.	Protein.	Fuel value.
	<i>Cents.</i>	<i>Pounds.</i>	<i>Calories.</i>
<i>With small amount of milk.</i>			
Breakfast.....	48	0.39	5,300
Dinner.....	51	.39	5,800
Supper or lunch.....	83½	.34	3,200
Total per day.....	182½	1.12	14,300
Total for one man.....	83	.28	3,575
<i>With large amount of milk.</i>			
Breakfast.....	43	.36	5,270
Dinner.....	47½	.41	5,400
Supper or lunch.....	34½	.34	3,600
Total per day.....	125	1.11	14,270
Total for one man..	81	.28	3,567

Menus IX, X, and XI, following, are intended to illustrate how nourishing food can be procured in sufficient quantities and moderate variety at a cost of not over 16 cents per day. The cost to the farmer would be much less, since these menus call for considerable amounts of milk, which is hardly worth more than one-half or one-third as much on the farm as it

costs in the towns and cities. Coffee has not always been indicated, but can be introduced for any meal at a cost of from $\frac{1}{4}$ to $1\frac{1}{2}$ cents per cup, according to how much coffee is used in making the infusion and how much sugar, milk, and cream are added.

Menu IX.—For family equivalent to 4 men at moderate muscular work.

FOOD MATERIALS.	Weight.	Cost.	Protein.	Fuel value.
	Lbs. Oz.	Cents.	Pounds.	Calories.
<i>Breakfast.</i>				
Corn meal, in mush or cake.....	0 5	1	0.032	414
Milk.....	1 6	1	.012	64
Sugar.....	2 2	$\frac{1}{2}$	.....	222
Toast.....	10	$2\frac{1}{2}$	.059	753
Butter (24 cents per pound).....	2	3	.....	434
Total.....	.....	8	.093	1,897
<i>Dinner.</i>				
Beef roll (for roasting).....	3 0	15	.417	2,280
Potatoes.....	1 8	2	.026	488
Beets.....	3	1	.007	85
Bread.....	10	$2\frac{1}{2}$	.059	753
Butter.....	2	3	.....	434
Total.....	.....	$23\frac{1}{2}$	.509	4,040
<i>Supper.</i>				
Beans, baked.....	3 0	6	.446	3,180
Pork.....	12	6	.012	2,556
Potatoes, fried.....	1 8	2	.026	488
Lard.....	2	1	.....	537
Bread.....	10	$2\frac{1}{2}$	.059	753
Butter.....	2	3	.....	434
Total.....	.....	$20\frac{1}{2}$	.543	7,948
Total per day.....	.....	$20\frac{1}{2}$	1.145	13,885
Total for one man.....	.....	18	.285	3,471

MENU X.—For family equivalent to 4 men at moderate muscular work.

FOOD MATERIALS.	Weight.	Cost.	Protein.	Fuel value.
	Lbs. Oz.	Cents.	Pounds.	Calories.
<i>Breakfast.</i>				
Oatmeal.....	0 6	2	0.059	697
Skim milk, 1 pint.....	1 0	1½	.084	170
Sugar.....	2	½	.....	222
Bread (homemade).....	1 0	8	.085	1,295
Sausage.....	10	6	.080	1,358
Butter (24 cents per pound).....	1	1½	.....	217
Total.....	.....	14½	.268	3,879
<i>Dinner.</i>				
Beef flank, stew.....	2 8	15	.420	2,998
Potatoes (60 cents per bushel).....	8 0	3	.054	975
Cabbage.....	12	1	.012	105
Corn meal pudding—				
Corn meal.....	4	½	.022	414
Skim milk, 1 quart.....	2 0	8	.068	340
Molasses.....	12	1	.020	987
Total.....	.....	22½	.604	5,809
<i>Supper.</i>				
Beef, warmed in gravy.....	1 8	3	.086	598
Hot biscuit.....	2 0	6	.340	2,600
Butter.....	2	8	.....	484
Milk, 1 quart.....	2 0	6	.033	325
Total.....	.....	18	.259	3,957
Total per day.....	.....	55	1.134	3,645
Total for one man.....	.....	14	.265	3,411

MENU XL.—For family equivalent to 4 men at moderate muscular work.

FOOD MATERIALS.	Weight.	Cost.	Protein.	Fuel value.
	Lbs. Oz.	Cents.	Pounds.	Calories.
Breakfast.				
Beef liver.....	1 0	6	.216	665
Hot biscuit.....	1 8	4½	.140	2,595
Butter.....	2 2	3	.....	434
Milk, 1 quart.....	2 0	6	.033	325
Coffee.....	.....	2	.010	410
Total.....	.....	21½	.399	4,429
Dinner.				
Beef brisket, boiled.....	2 8	15	.313	3,950
Apple pie.....	1 0	5	.033	1,250
Potatoes.....	2 0	3	.036	650
Bread.....	8	1½	.048	603
Butter.....	1	1½	.....	217
Skim milk, 1 quart.....	2 0	3	.033	170
Total.....	.....	29	.463	6,840
Supper.				
Corn meal in mush or cake.....	0 6	1	.033	621
Skim milk, 1 quart.....	2 0	3	.033	340
Bacon.....	8	8	.046	1,390
Coffee.....	.....	2	.010	410
Total.....	.....	14	.157	2,761
Total per day.....	.....	64½	1.019	14,080
Total for one man.....	.....	16	.255	3,507

Discussion of the menus.—These menus attempt to give, as nearly as convenient, the range of food materials and the variety of combination which might be found in the average well-to-do household. Some of the menus are more varied and costly than others, and a few are given showing the effect of the use of more milk, and also how a diet might easily become one-sided. The quantities of the different foods used per meal will not, it is believed, be found out of proportion to each other, though of course they will not suit every family. The weights of all materials, oatmeal and other cereals, meat, vegetables, etc., are for these substances as purchased.

The calculations of the quantities of nutrients contained in the different foods is based upon the average percentage composition of these materials. Inasmuch as the fats and carbohydrates are used simply as fuel they are not shown in the menus, only the quantity of protein and the fuel value of the food being of interest.

The cost of the different food materials must of necessity be more or less of a varying quantity, depending upon the season of the year, the character of the markets, large or small, city or country, etc. Of the more important food materials, the assumed price per pound is as follows: Beef loin, 18 to 25 cents; shoulder, 12 cents; round, 14 cents; chicken, 15 cents; mutton loin, 16 cents; lamb leg, 20 cents; bacon, 16 cents; sausage, 10 cents; milk, 3 cents (6 cents per quart); skim milk, 1½ cents (3 cents per quart); butter, 32 cents; cheese, 16 cents; eggs, 16 cents (24 cents per dozen); flour and meal, 2½ to 3 cents; cereals, 5 to 8 cents; bread, 4 cents; potatoes and other

vegetables, 1½ cents (90 cents per bushel); bananas, about 8 cents (20 cents per dozen); oranges, about 7 cents (25 to 40 cents per dozen); apples, 1½ cents per pound (90 cents per bushel).

It is probable that the above figures represent more nearly the average prices of the different food materials in the eastern part of the country than in the central and western portions, where meats, cereals, and many other products are somewhat cheaper. It is also to be borne in mind that by observing the markets many food materials can be purchased much cheaper than here indicated, while on the other hand there may be times when they will be much more expensive. The choice of vegetables and fruits will naturally be governed by their abundance and cost.

Another point that must not be overlooked is that the quantities, and consequently the costs, here given are for four workingmen; that is to say, men engaged in moderately hard muscular labor. Of course, different individuals differ greatly in their needs for food. These figures express only general averages and are based upon the best information accessible.

When a dish is indicated that must be prepared at the home the proportions of nutrients entering therein are indicated, but not of condiments, flavorings, and other accessories. Thus, if lemon sauce is indicated with a pudding no mention is made of the lemon peel, which has little food value and is simply used for the flavor it imparts. Likewise amounts of vinegar are not indicated where salads are called for. The values given under the head "tea or coffee" are obtained by figuring the actual cost and nutrients of the ingredients entering the coffee. It is calculated that for four cups of coffee 2 ounces of milk, 2 ounces cream, 2 ounces sugar, and 1½ ounces coffee may be used. These would cost 3½ cents, and would furnish 0.010 pound of protein and a fuel value of 410 calories. The coffee or tea infusion itself contains no nutrients. In the menus it has been supposed that at times the persons would want but one cup of coffee each, while at times they would desire two cups, and occasionally allowance has been made for six cups for the four persons.

The weights of meats and vegetables given in the menus are for these articles as found in the market. The meats will include, as a rule, more or less bone and the vegetables skin, which is inedible and is rejected. In estimating the nutrients in these foods allowance is made for what has been found to be about an average proportion of bone in different cuts of meat. In vegetables it is supposed that from one-fifth to one-sixth will be thrown away in preparing these for the table. The weights of the cereals are for these in the dry condition before cooking. In cooking it is understood that flour, sugar, butter, milk, etc., are measured, rather than weighed, and both the quantity by bulk and by weight are as a rule recorded in the menus. It is a very difficult matter to reduce teaspoonfuls and tablespoonfuls of materials to a definite weight, and even cupfuls are a very unsatisfactory measure. In general the following averages have been taken for the weight of different measures of different foods:

One cupful=one-half pint	{	=one-half pound of rice, cornstarch, sugar, milk, syrup, butter. =six ounces of hominy, corn meal, buckwheat. =one-fourth pound of flour, wheat breakfast foods, cerealine, oatmeal.
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One tablespoonful { flour, cereals, etc.=about $\frac{1}{2}$ ounce.
 { corn meal=about $\frac{1}{2}$ ounce.
 { butter, starch, rice, sugar, etc.=about 1 ounce.

The weights of a cupful of the different foods may be considered as fairly accurate, but the estimated weight of one tablespoonful of different materials is one of the crudest makeshifts, depending upon the spoon, and especially upon what the person considers a spoonful.

In the menus given above only such an amount of each food material is indicated as may be completely consumed at each meal. No allowance is made for material to be left over. Of course, in the ordinary household it is calculated that there will be a rather larger quantity of the different dishes prepared than will be consumed at one meal. The food remaining is either wasted or warmed up in some of the many ways with which the good cook is familiar.

The principal classes of food materials may be roughly grouped as follows as regards the proportion of protein to fuel value, beginning with those which have the largest proportion of protein and ending with those which contain little or no protein:

Foods containing a large amount of protein as compared with the fuel value.	{	Fish; veal; lean beef, such as shank, shoulder, canned corned, round, neck, and chuck; skim milk.
Foods containing a medium amount of protein.	{	Fowl; eggs; mutton leg and shoulder, beef, fatter cuts, such as rib, loin, rump, flank, and brisket; whole milk, beans and peas; mutton chuck and loin; cheese; lean pork; oatmeal and other breakfast foods; flour, bread, etc.
Foods containing little or no protein.	{	Vegetables and fruit; fat pork; rice; tapioca; starch; butter and other fats and oils; sugar, syrups.

In planning a well-balanced diet the following points must be considered:

(1) The use of any considerable amount of fat meat or starchy food should be offset by the use of some material rich in protein. Thus, if roast pork is to be eaten for dinner, veal, fish or lean beef might well be eaten for breakfast or supper or both. Bean soup furnishes a considerable amount of protein, while bouillon, consomme, or tomato soup are practically useless as a source of nutriment. Skim milk also furnishes protein, with but very little accompanying fats and carbohydrates to increase the fuel value.

(2) The use of lean meats or fish for all three meals would require the use of such foods as rice, tapioca, or cornstarch pudding, considerable quantities of sugar and butter, and more vegetables, in order to furnish sufficient fuel value.

(3) Since flour, sugar, and butter or lard enter very largely into pastries and desserts, the larger the quantities of these dishes that are consumed the larger does the fuel value tend to become as compared with the protein.

XX.

CARE OF MILK ON THE FARM.*

INTRODUCTION.

Impure milk unprofitable.—Many dairy farmers are prosperous and have established the fact that the dairy industry can be made to yield good profits, while others, who seem to have the same opportunities for success, fail to find the profitable side. In the endeavor to ascertain the most important causes of failure, expressions of practical men engaged in the different branches of dairy work have been sought. A large number of inquiries were recently sent out from the dairy division to butter and cheese makers and others, requesting them to state what part of dairying, in their judgment, is in the greatest need of improvement. The following are some of the replies received:

The delivery of milk by patrons and the proper care of it prior to delivery. Frequently milk is refused on account of its advanced decomposition. (From the manager of a creamery.)

The care and handling of milk on the farm and until it gets to the creamery. (From a butter maker.)

The careful handling of milk and its delivery to the factory in good condition. (From the salesman of a cheese factory.)

Care and handling of milk before it gets to the creamery or cheese factory. (From an operator.)

Taking care of the milk before it gets to the creamery. (From a farmer.)

Handling the milk from the time it leaves the cow until it is put onto the train. (From a milk dealer.)

Very few replies referred to the chemical composition of the milk or to the amount of butter fat it contained. Milk that is poor in fat naturally, or because it has been adulterated by skimming or watering, does not now give the butter or cheese maker much concern. Since the introduction of the fat test and the system of paying for the amount of fat delivered instead of for the bulk of milk there is no strong temptation to water or skim.

In reply to many statements received, of which a few are quoted above, and in answer to numerous inquiries on the same subject, an attempt is here made to review some of the most valuable information available, and to explain the causes of changes in milk, the most common ways in which it is contaminated, and how to keep it pure. Reference is made to winter as well as to summer dairying, because that branch is rapidly developing

*By R. A. Pearson, B. S., assistant chief of dairy division, Bureau of Animal Industry. Farmers' Bulletin 63, U. S. Department of Agriculture.

and promises to become of great importance. Complex data of scientific experiments are not given, and technical explanations are omitted as far as possible.

On a large proportion of dairy farms many of the fundamental principles which should be observed in producing pure milk are almost entirely overlooked. This is usually due to lack of appreciation of their importance more than to intentional neglect. In most cases bad conditions are promptly improved when their dangers are known. Special knowledge is as necessary in conducting the dairy as in other occupations. When one understands something of the sciences affecting dairying, the changes in milk cease to be mysterious, unexplainable phenomena, and the work connected with the dairy, instead of being unprofitable, uncertain, and monotonous, as some consider it, may become profitable, interesting and instructive.

The value of milk when it is delivered to the factory depends largely on the care it has received previous to delivery, and its condition as well as its fat content should influence the price paid for it. Every dairyman knows that the handling of milk the first few hours after it has come from the cow has a great influence on its quality and the quality of the products made from it. The care of milk seems a simple matter, but better methods in our dairies are of the greatest importance to the success and reputation of American dairying.

It is to the interest of every patron of a creamery or cheese factory that the milk used shall be the best and purest that can be produced. Anyone who increases his monthly check by adulterating his milk, accepts payment for what he did not deliver, and is stealing that amount from others to whom it belongs, but anyone who delivers badly contaminated milk to a creamery does even worse. His milk may spoil the entire production of the day, and thus largely decrease the returns to every patron. Butter and cheese makers should absolutely refuse to accept milk that is tainted or unfit for use; they must do this in justice to themselves and to patrons who deliver good milk.

The attempt has sometimes been made to estimate the losses caused by skimming and watering, and enormous amounts are named, but it is not believed that these nearly equal the losses caused by taints or changes in the milk due to neglect. In contracts and agreements the expression "pure milk" should not be taken to mean simply milk having a normal chemical composition, but freedom from all unnecessary contamination; the word *pure* should be understood in its broadest sense.

BACTERIA.

When left to itself, under ordinary conditions, animal and vegetable matter sooner or later undergoes a change; these changes are familiar to everyone as decay, decomposition, putrefaction, or rot. The most common change of milk is known as souring; but there are many other fermentations, all of which were once supposed to be due to ill health of the cows, to foods eaten, to thunderstorms, etc. It is now known that changes of milk and other organic matter are caused by very small vegetable organisms called germs, micro-organisms, or bacteria. Different forms of these little creatures produce different effects. Some accomplish useful or harmless

changes, while a few, known as pathogenic bacteria, produce disease in their host.* If none of them were present no fermentative change would take place. But they are abundant in nature, and manage in some way to get into most organic substances.

Many persons think of the term bacteria as relating to a disease of some kind; they fail to appreciate that among these micro-organisms man has friends as well as enemies. They are great scavengers, and they have a most important connection with agricultural processes; in manufacturing certain products their action is depended upon almost entirely; they are

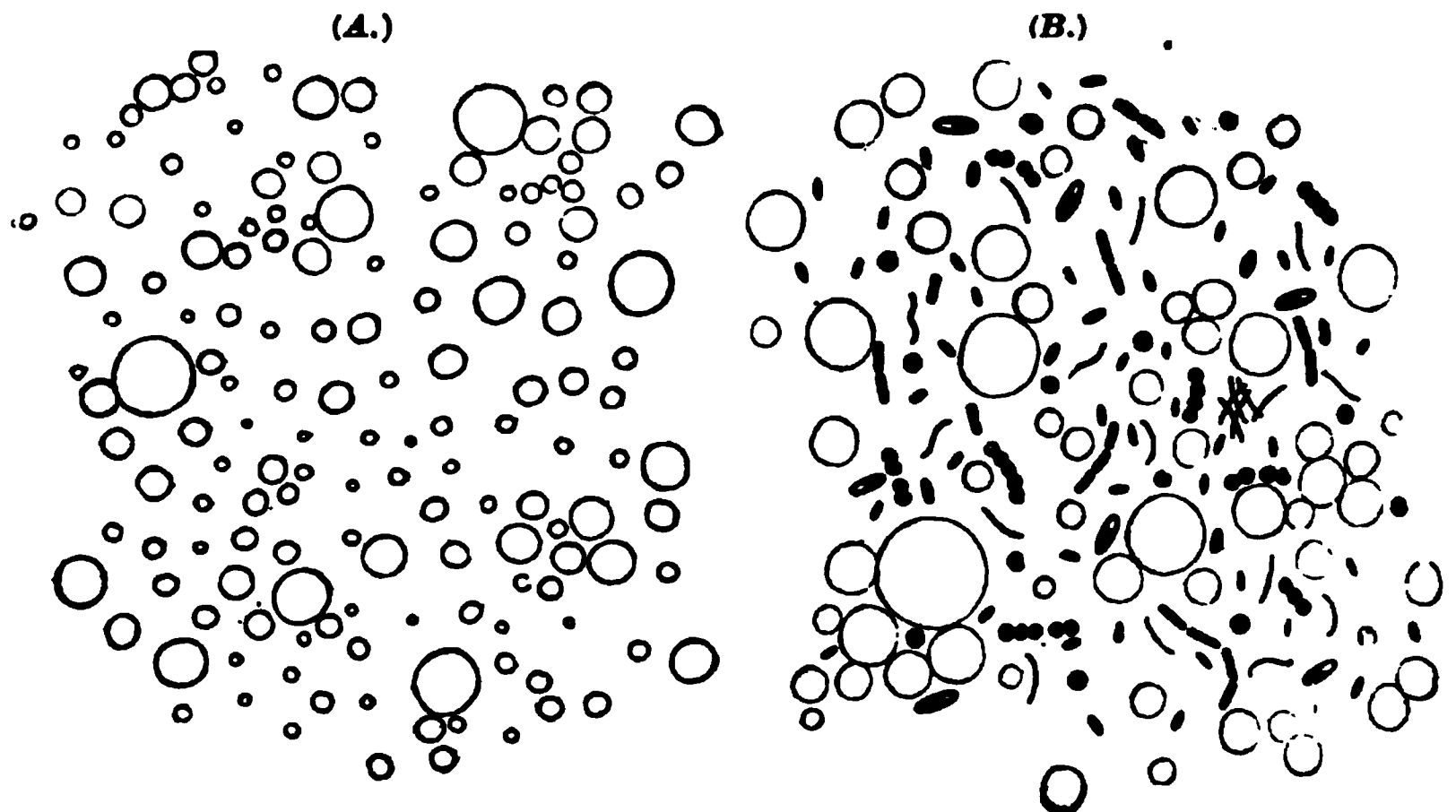


FIG. 1.—Microscopic appearance of pure and impure milk: A, pure milk; B, after standing in a warm room for a few hours in a dirty dish, showing, besides the fat globules, many forms of bacteria (Moore). This latter appearance is obtained only with the aid of a high-power microscope. Pearson; Farmers' Bulletin 68, U. S. Department of Agriculture.

absolutely necessary in the manufacture of fine butter and in giving variety to cheese.

Description of Bacteria.—Bacteria are so small that it is difficult to form a conception of their size; it would require many hundred of them in a continuous line to extend an inch. A thousand billion of them, if placed together, would weigh but a small part of an ounce. In a single drop of badly infected milk the bacteria may be counted by the million. It is evident that they can not be seen with the naked eye, but require to be highly magnified in order to be identified. (Fig. 1.) Bacteria are not all of the same size nor the same shape, nor do they all grow alike under the same conditions. Their differences in these respects aid in classifying them.

They are composed of a single cell, and the most common way by which they reproduce themselves is by the division of the "parent" cell into two smaller cells. This is accomplished by the bacterium gradually becoming more and more constricted about the middle until it separates into two parts; these increase in size and the process is constantly repeated. Under favorable conditions multiplication takes place with great rapidity. A bacterium may develop and be ready to reproduce itself in a few minutes.

*The term "host" is applied to the subject infested, whether animate or inanimate.

Another form of reproduction of bacteria is by spores. These correspond to seeds of plants, and are usually formed under circumstances not favorable to the continued development of the bacteria and their multiplication by division. Like the seeds of wheat, the spores can endure conditions which would be fatal to the growing form, and after surviving such conditions they quickly develop when more favorably situated. Some spores have been found to retain their powers of germination for more than ten years.

Conditions affecting bacterial growth.—Three things are essential for the growth and development of bacteria; they are food, warmth and moisture, and when these are furnished, as they are to a greater or less extent in every dairy, the multiplication of bacteria takes place. Some species require other conditions besides those named; certain ones must have access to air, while others cannot thrive in the open air; some require to be in an acid medium, but to most species a medium having a neutral or alkaline reaction is necessary; darkness is requisite to some and preferred by most species; their growth is checked by bright light, and direct sunlight is fatal.

The food elements required by bacteria are present in the constituents of milk, and they are in a readily available state. Nitrogen, carbon, oxygen, and mineral matter are essential and are furnished by the casein, albumin, milk sugar and mineral salts. The butter fat is of little importance as a food for germs.

Bacteria thrive within wide limits of temperature. The degree of heat has an important effect on their growth. Some species do best at a high temperature, near blood heat, while others prefer a lower temperature. Every person who has handled milk knows that if kept a long time in a moderately warm place it undergoes quite a different change from that which takes place at a high temperature. The reason for this is that different degrees of heat are favorable to different species of germs. The species favored rapidly increases and covers up the work of others less favored, but which may continue to grow slowly. At about 90 degrees Fahrenheit most forms grow with great rapidity, the rate of their multiplication decreasing with the decrease of temperature. Bacteriologists have shown that at 93 degrees Fahrenheit certain germs may increase in number in four hours more than two hundred fold, while at 55 degrees Fahrenheit their increase is only about eight fold. An experiment is reported in which a difference of 18 degrees in the temperature of two samples of milk caused, in fifteen hours, a difference of almost 75,000,000 bacteria per cubic centimeter.* This shows very plainly how much the rate of growth of bacteria depends upon temperature.

At 50° F. bacteria are quite inactive, but at this and considerably lower degrees of heat they retain life, and some forms continue to multiply. Freezing does not kill them. Some species can withstand a temperature of many degrees below zero, and with the return of suitable conditions again commence to grow.

Up to a certain point the higher temperatures have the same effect as cold, i. e., make the germs inactive. But when the heat is raised to 125°

* One centimeter is about the same as two-fifths of an inch, and a cubic centimeter is about equal to half a thimbleful.

F. some are killed; others, not harmed by this temperature, are destroyed by greater heat. A sufficient temperature to kill almost all of the growing forms found in milk is 165° F. Spores require still more heat; some can withstand boiling temperature, 212° F.

If milk is heated high enough to kill all the living forms of bacteria and then suddenly cooled to a low temperature, it will keep sweet a long time, because it is free from growing germs. It must be quickly cooled, however, or the spores will develop while the temperature is ranging from 110 down to about 60 degrees, and the bacteria thus formed may continue to increase slowly after the cooling is completed, at the low temperature at which the spores would not have germinated. When milk is heated for the purpose of killing bacteria (the process is called pasteurization or sterilization) it should be held at the highest temperature at least ten minutes, as some forms are not killed by a short exposure to the same temperature which is fatal to them in a longer exposure. In dry air much higher degrees of heat than those named are necessary to kill bacteria. For this reason steam is generally used instead of dry heat for sterilizing utensils.

Bacteria also require moisture. It is well known that dead organic matter quickly disintegrates when it is in a moist condition and its changes are arrested when it is dried. Milk being a fluid, all the moisture that is necessary for micro-organisms is at hand. There is no danger of food being too dilute for bacteria; some forms do well even in distilled water. In milk, germs seem to find ideal conditions.

The chief agents that are antagonistic to bacterial increase are, together with light, the opposites to the first three favorable conditions mentioned above, viz., lack of food, extremes of temperature, and dryness. These are the dairyman's most important weapons, and when he has learned to use them properly he need have no fear of milk souring too soon or being otherwise affected by germs. The operator of a creamery or factory is also sometimes able to take advantage of the fact that certain species of bacteria are antagonistic to each other and can not grow well together if they are in the milk at the same time. In such a case there is a battle for existence, the kind having the smaller number to start with, or being less favored than the other by temperature or other conditions, is usually overcome. Thus one can at times cut off the effects of undesirable bacteria by giving advantages to other desirable or harmless forms that are hostile to them. This is what takes place when the butter-maker adds a "starter" to his cream and ripens it at a high temperature as rapidly as possible to prevent the increase of a taint which he may discover in the milk. A starter is a preparation or culture containing large numbers of the peculiar kind of bacteria that ripen cream; by its use proper forms of fermentation are started in milk or cream.

When micro-organisms are growing, new products are formed from the constituents of the medium by which they are surrounded. For example, the lactic acid bacteria, which are the most numerous about a dairy, and which cause milk to sour, change the sugar of milk to lactic acid. After a certain amount of acid or other product of growth has been developed, some bacteria can not longer thrive; the surroundings are so changed by their own operations that they cease to increase. This fact, however, is not of much practical value to the milk producer; the fermentation of his milk should never be allowed to proceed so far that it stops itself.

Bacteria cease to grow when in the presence of certain chemicals. When these are added to milk they are known as preservatives; when they are used for such purposes as killing the germs in or about a dairy they are known as disinfectants. Both of these will be referred to later.

DAIRY BACTERIA.

The greatest number of bacteria are to be found where their food is most abundant. Animals, feed, manure, and milk are all hosts or breeding grounds for bacteria. For this reason, the dairy is a place where myriads of germs of different kinds are to be found. They must be always kept in mind, studied, and persistently fought or controlled.

Number of bacteria in milk.—Milk ordinarily contains large numbers of bacteria. It is one of the few media that is well adapted to almost any species and quickly becomes inhabited with large numbers of those which obtain entrance to it. There may be from a few hundred to many millions in a single drop, depending upon its exposure and the time and opportunity the germs have had for increasing. Dirt in milk is a sure sign of large numbers of bacteria. As the rate of increase is influenced by temperature, the number present at any time also depends much upon the previous temperature of the fluid. Russell has shown that the weather has a marked influence on the bacterial content. He examined the milk of a patron on two successive days, the first being warm and the second cold and rainy; 1 cubic centimeter contained, respectively, 1,150,000 and 48,000 bacteria, or about one twenty-fifth as many on the cold, wet day as on the warm day. It is apparent that this difference was due chiefly to the purity of the atmosphere and a lower temperature. Another investigator counted from 50,000 to 100,000 germs per cubic centimeter of the first milk drawn. In some cases the last milk is sterile, or germ free; in others it contains numerous germs. City milk usually contains from 10,000 to hundreds of thousands of bacteria in a single cubic centimeter.

The number of bacteria in a sample of milk is an indication of its purity, but not an absolute proof that it is or is not of good quality. Large numbers of harmless bacteria are sometimes found in good milk. It is the harmful ones, and those that are liable to become harmful if present in too large numbers, that chiefly concern the dairyman. If they are kept out of the milk, or their growth is controlled, the number of harmless ones will also probably be reduced, for the measures which restrict one class, have a like effect on the other. Whenever large numbers of harmless germs are found, there is probability that dangerous forms are included.

Kinds of dairy bacteria.—Over two hundred kinds of dairy bacteria are found in milk and its products, new and old. Many of these have not been completely described and will require much more study before their characteristics are fully understood. Different forms are found in different sections of the country. Different sources of contamination contribute different types of bacteria to the milk, and the large number of forms does not seem strange when their many sources are studied. One would expect to find a difference in kinds as well as in numbers of bacteria in milk of cows kept in pasture and milked in the open air, and in milk of cows continuously stabled. Such is the case. Especially is this true in regard to the germs of manure, which are more abundant in the stable than out of

doors. As a result of their struggle for existence, frequently a smaller number of species is in milk after it has stood than when perfectly fresh, although the number of individuals may have greatly increased.

For practical purposes, dairy bacteria may be separated into three classes, as follows: (1) Harmless bacteria; (2) useful bacteria; (3) harmful bacteria.

(1) Harmless bacteria.—These are the most numerous of the forms found in milk. They are of comparatively small direct importance to the milk producer, but they are not in milk when first secreted and, as suggested above, if they obtain entrance to it they are evidence that other germs also have had an opportunity to plant themselves.

(2) Useful bacteria.—Some forms of bacteria are essential to dairy operations. Cream is generally allowed to ripen or sour before it is churned—in other words, useful bacteria are given conditions favorable to their growth, and they cause acid to develop. Butter flavor depends upon several conditions, but one of the most important is the action of certain bacteria which, in the process of maturing or ripening, produce the desired aroma and flavor—cultures of bacteria for this purpose are now regularly sold on the market. The chief differences between varieties of cheese is caused by the kinds of bacteria that grow in them. Bacteria needed in some cases are not wanted in others, so the same species which are useful at one time may at another time be harmful.

(3) Harmful bacteria.—These form the most important class. They may be subdivided into two groups, viz., those having an injurious effect on the milk, and those not apparently affecting the milk but having an injurious effect on the health of the consumer. Many species fall in only one of these subdivisions; others belong to both.

Certain bacteria may be indirectly injurious by producing conditions favorable for other germs which are directly injurious, but not able to grow in milk until its nature has changed. For example, a species which causes bitter milk does not thrive until the ordinary sour milk (lactic acid) germs have developed some acidity. It is not necessary to go into details as to the many different changes produced directly and indirectly by numerous forms. Some are troublesome whenever they find their way into the milk, others become a nuisance only when they are present in very large numbers. Types that color the milk, form gas, or produce disagreeable flavors are always objectionable. Farmers' Bulletin No. 29 treats more fully and technically of the bacterial changes of milk. The bad effects of those bacteria which produce a pronounced change in milk are usually confined to the milk itself. Its change is so marked that it is rarely used as food.

Some bacteria thrive in milk and do not have a marked effect on it, but may cause disastrous results to the consumer. These are germs of disease and should be most carefully guarded against. Good proof exists of the transmission of several diseases by milk, and in a number of instances epidemics have been traced to an infected milk supply.

Another kind of bacterial action which may indirectly result in injury to health is referred to by Conn. He states that some of the common milk bacteria may be present in such great numbers as to produce poisonous

toxins "which are directly injurious to the weak stomach of the infant or the invalid." Many cases of cholera infantum and similar troubles are said to be due to these causes.

All forms of bacteria are objectionable in milk that is to be consumed as food in its natural state, and, indeed, most forms are undesirable in milk that is to be manufactured.

HOW MILK BECOMES IMPURE.

After learning something of the characteristics of bacteria and their abundance in milk, natural questions of interest are, How do they get into milk? and, How can they be kept out of it? This is an unpleasant subject when looked at from its worst side, but methods of producing milk are constantly being improved, especially in dairies which send milk to cities having proper regulations, enforced by boards of health or city milk inspectors, and in dairies supplying well-conducted creameries and cheese factories.

The causes of impure or unnatural milk will be discussed under three heads:

- I. Diseased animals and persons and unnatural conditions.
- II. Uncleanliness in the stable.
- III. Uncleanliness outside of the stable.

I. DISEASED ANIMALS AND PERSONS, AND UNNATURAL CONDITIONS.

Spread of infectious diseases.—Contamination of milk by the germs of disease is the most dangerous form. Some infectious diseases attack animals and man alike, and if a cow is suffering with one of these she is a menace not only to the whole herd, but to persons who consume her product, for her milk may readily act as a carrier of germs to the consumer. It has been found that in certain diseases, especially when the udder is affected, the germs may be in the milk at the time it is drawn; then no amount of protection after milking will assure freedom from disease-producing bacteria.

Tuberculosis, or consumption, is the disease that is most common and most to be feared. Much has been written on this subject, and it is unnecessary to here discuss the particular conditions that cause the malady or aid its progress. In the advanced stages of tuberculosis the milk becomes unnatural in appearance, but sometimes even before the udder is known to be affected it may contain the specific germs, called bacilli tuberculosis.

An English authority holds that diphtheria may similarly be transmitted from the cow to the milk consumer, and this seems to be true of scarlet fever, or a closely allied disease. Foot and mouth disease and anthrax are some of the others that may infect the milk. It is fortunate that when the animal is affected with some of these dangerous diseases the milk flow stops. It is also fortunate that most of these diseases do not occur, or are very rare, in this country.

Milk may be the means of conveying to the consumer germs of disease from other persons. For example, if any of the attendants have a contagious disease, or are at any time exposed to such, the air about them and their surroundings is more or less infected, and the germs may easily get into the milk in ways described on the following pages.

The most important diseases whose germs enter the milk from external sources are typhoid fever, diphtheria, scarlet fever, cholera and tuberculosis. Numerous outbreaks of typhoid fever have been reported where there was no doubt about the milk supply being the carrier of the germs, they having gained entrance to it from external sources, such as infected water or a person who had nursed or been otherwise exposed to a typhoid fever patient. Outbreaks of diphtheria have been traced to milk from farms where diphtheria was known to exist in the families of the attendants. The same is reported of scarlet fever and cholera.

Abnormal milk and slight variations.—Other factors than bacteria may influence the appearance and composition of milk at the time it is drawn and render it impure and unnatural. The cow's health is an important factor; but abnormal milk is also due to excitement of the cow, temporary disorder, bad treatment, injury, time from calving, and substances eaten. And all of these causes may seriously affect the quantity as well as the quality of milk. Some of them are responsible for sudden slight variations in the quality of milk, as shown by the regular tests, and which frequently seem so mysterious and without cause.

When a cow is diseased she may continue to give milk, but it is liable to be abnormal in composition. The fat may be reduced to a quarter of the usual amount, so that the milk appears skimmed, or the fat may be abnormally increased. Being "in heat" or "off feed" has a similar but less marked effect.

Excitement of the cow affects the milk; even changing the stall may slightly alter its composition. The cow is an animal of regular habits. She expects to be milked at a certain time and to be fed at a certain time, and becomes more or less uneasy if the usual programme is not carried out. A change of milkers may result, for a few milkings, in a reduced yield or in milk of poorer quality.

Many slight variations in the quality and quantity of milk may be charged to neglect. The farmer who leaves his cows out in a bleak storm should not be surprised to find that his test at the factory has fallen, while that of his neighbor whose cows were sheltered, did not fall. One of the first functions of food is to maintain the bodily heat, and when necessary it will be used in this way instead of forming milk. Thus, the state of the weather, temperature, and storms affect the milk to a greater or less degree. Dairymen are all aware that bad treatment or neglect quickly results in decreased profits. The brutal treatment of a cow by an attendant, by kicking, beating, or otherwise, is not without effect on her milk. Bloody milk is often caused by an injury to the udder, which may have been inflicted by a thoughtless attendant. Sometimes the "boss of the herd" is to blame for such injuries to the weaker animals.

The natural variation of milk due to the time since calving is of course unavoidable; it is so gradual and so slight that sudden changes cannot be attributed to this cause. The first milk given after parturition is known as colostrum; it contains an excessive amount of albumen, and its other constituents are not in the same proportions as later. Within a few days it becomes natural, and gradually grows richer in fat as the period of lactation advances. Colostrum is unfit for use except as food for the young calf.

The influence of food upon the quality of milk is a subject which has received much attention. Foods undoubtedly have some effect on the quality of milk produced, but it is not as marked as supposed by many; the breed and individuality of the cow is of greater importance. Slight variations in composition are caused by a sudden change of feed, and milk is sometimes rendered disagreeable by taints caused by eating turnips, onions, garlic, sour ensilage, ragweed, or other strongly flavored feeds or weeds.

II. UNCLEANLINESS IN THE STABLE.

The largest part of the impurities found in milk get into it in the short time after it is drawn from the cow and before it leaves the stable. This brief period may be called the critical time in the history of dairy products. In many stables myriads of bacteria are entering the milk every minute it remains exposed, being carried there by many kinds of foreign matter, some of which would do no harm were it not for the germs it brings. Grot-enfelt mentions the following impurities which he found in unstrained fresh milk: Manure particles, fodder particles, molds, fungi, cow hairs, particles of skin, human hairs, parts of insects, down from birds, small bits of wood, woolen threads, linen threads, fine threads, soil particles. It is evident that these different kinds of foreign matter are derived from numerous sources, but the bulk of the impurities consists of ordinary stable dirt, chiefly manure, and its presence in quantities, in milk, is evidence of slovenly methods. Over 50 grains of this matter have been found in 100 pounds of milk, and when it is remembered that it contains myriads of bacteria of the forms causing putrefaction and decomposition, it does not seem strange that milk is soon affected by its presence. Germs introduced in this way, in large numbers, may act as poisons to the delicate consumer and cause severe intestinal troubles.

Dirt gets into the milk when in the stable, principally from three sources, viz., the cows, the milkers, and the air. But this classification is unnecessary for stables which are carelessly cleaned only once or twice a week, and in which it is impossible for an animal or person to remain any length of time and come out undefiled; in such places there is a constant shower of bacteria.

Exterior and interior views of buildings where the production of pure milk would be impossible are shown in Figs. 2 and 3. Any building rapidly going to ruin would fall in this class, but the illustrations show new structures especially erected for dairy purposes. The small building on the right is the dairy house. Note the general appearance of shiftlessness about the buildings and the absence of windows or other provisions for light and ventilation. The pails, cans and strainers are left in impure stable air, and the dairy house is supplied with air which has just passed over heaps of manure. Many stables are so dark that it is impossible even at midday to see one's way in them, and they are so close that it is a relief to get out into the fresh air after being inside for a few minutes.

Dirt from the cows.—The cows supply most of the dirt to milk, as anyone will admit if he is at all familiar with the conditions in many stables. It is not uncommon to see cows covered with so much dust that the color of their backs can not be seen; their flanks, hips, and sides are sometimes plastered with layers of manure.

FIG. 1.—Cow stable and dairy house improperly located and constructed, and poorly cared for. Pearson; Farmers' Bulletin 63, U. S. Department of Agriculture.

FIG. 2.—Interior view of an unsanitary cow stable. Pearson; Farmers' Bulletin 63, U. S. Department of Agriculture.

When the work of cleaning the cows is neglected, it is impossible to keep milk even decently clean when milking. Large lumps of dirt, hairs, and straws are continually falling into the pail. The hairy coat is an excellent harbor for dirt and bacteria, and every time anything touches the skin, or the udder or surrounding parts are disturbed a shower is precipitated. As more or less violent motion always occurs at milking, the loosely adhering particles are easily dislodged just at a time when the milk pail is in a position to collect them.

Untidy attendants.—Untidy attendants constitute another source from which milk is contaminated. They frequently turn from cleaning horses, or other equally dirty work, to milking the cows, with no thought of their unfitness to handle milk. On some farms milking is regarded as the dirtiest of all work, and the milkers prepare for it accordingly. Dust adheres to the milker's clothes almost as readily as to the cow's coat, and it easily falls from his shoulders and sleeves into the pail; his hands and finger nails also contribute a share to the contamination. Thus he may be the means of conveying to the milk as many kinds of germs as fall from the cow, and in addition to these he may transmit human diseases, as referred to above.

Dust-laden air.—Air is a source of germs found in milk. It is not a medium capable of supporting bacteria by itself, but it carries more or less of small particles of dust and organic matter in suspension, and these have many bacteria in and upon them. On account of the dust constantly being raised the number of organisms in the air of a stable may be considerable, especially if dry feed stuffs are used and the manure is allowed to become dry on the floor. Over 100 different kinds of organisms have been found in a single quart of stable air. These do not increase in numbers while floating about, but they quickly commence a vigorous growth when they fall into fresh, warm milk. As dust is constantly tending to settle, the largest number of bacteria is to be found near the floor, and a vast number may fall into a milk pail or can in a very short time.

In some cases stable air contains so much dust, and milk is exposed to it so long, that it is the chief means of contamination. Most of the dirt in the air is from dry, dusty fodder and bedding. When hay is thrown down through chutes, the air is quickly filled with dust, and air currents and the constant shaking of the hay by the animals keep the dust from settling. Some rises every time the bedding is disturbed, and it is naturally most abundant beneath the cow during milking.

Foremilk.—Although milk is sterile when it is first secreted, it is extremely difficult to obtain sterile milk from the udder, because some germs succeed in finding their way to it even before it is drawn. A few drops of milk are always left in the teat after the milking is done; and the end of the teat remains moist. Germs from the air and from the dirt on the udder or bedding quickly plant themselves in this thin layer of fresh milk and rapidly increase in numbers. Some work up through the orifice into the cavity of the teat and milk duct, and those kinds which do not require a supply of air for growth find most favorable conditions there, and the milk in the vicinity of the teat becomes contaminated by their increase. In

this way lactic acid, or sour milk, bacteria, which later becomes so abundant, commences their work before the milk is drawn from the udder. Sometimes this form of contamination is quite serious, the first milk, or "foremilk," serving to affect the whole mess.

III. UNCLEANLINESS OUTSIDE OF THE STABLE.

What has already been said about improperly kept stables applies equally, in the main, to an unclean dairy building or room. Milk will not remain pure if stored in an unclean place. One of the chief faults in the care of a dairy room is in allowing it to remain continuously damp. The sloppy methods so often practiced are favorable to bacteria.

The two most important sources of contamination after the milk has left the stable are unclean dairy utensils and impure water; although these often affect the milk while in the stable, the trouble is usually due to their own improper care or infection elsewhere.

Utensils are sometimes made of poor material or are so complicated or irregular that milk is not completely removed from them and furnishes legions of bacteria to the next lot of milk with which they come in contact. Wood has so many pores that it is almost impossible to clean it. The supposed economy of using old, dilapidated vessels of any kind, those having double bottoms, patches, dents, or bare places from which tin has been worn, frequently results in impure milk. Neglected strainer and wiping cloths, and promiscuous rags used for drying, are important sources of contamination.

Cleaning utensils is an operation sadly neglected on many dairy farms; certain articles, as coolers, whose use is intended to improve the milk, are sometimes so poorly cleaned that they contaminate the milk more than they purify it. Milk pails washed only in cold or luke-warm water soon become covered with a greasy, sticky layer of foreign matter. Dirt is often allowed to accumulate about the necks of cans and in little grooves or ridges under the shoulders, and careful dairymen are surprised to find these accumulations when they investigate the places hidden from view. Such conditions are most liable to be found when the same cans used for delivering milk are used for returning to the farm, waste products in which numerous kinds of fermentations are progressing. The milk receiver sometimes sticks labels on such cans to call especial attention to their condition. This is a good plan.

Water from cisterns, shallow wells, or streams, or that which has been long exposed to the air, can not be relied upon as pure. It is liable to contain many forms of vegetable life. Sometimes surface drainage, or the seepage from privy vaults or barnyards, finds a way through the ground to a well, yet the use of the water is continued without knowledge of its dangerous qualities. In this manner water used in a dairy has spread typhoid fever.

If impure water is supplied to a dairy it may affect the quality of the milk indirectly by injuring the health of the cows. But its first effect is to contaminate the milk directly by the water which remains on the utensils when they are not properly dried and sterilized, or by water which is purposely added for adulteration. Frequently milk is stored in tanks of water which is purposely added for adulteration. Frequently milk is stored in

tanks of water. This water is rapidly fouled by the dirt on the bottoms and sides of the cans, or by impure ice, milk slopping over, and by rinsing various articles in it, and it thus becomes another means of contamination.

HOW TO KEEP MILK PURE.

Experiments have shown that the contamination of milk occurring under ordinary circumstances can be reduced over 95 per cent by taking care to avoid all possible sources of impurity and conditions favoring germ growth. The fact that bacteria are usually attached to larger bodies makes the work of preventing their entrance into milk comparatively easy. But with all the care that it is practicable to observe, some bacteria will get into milk; therefore it must be cooled as soon as possible and held at a low temperature to prevent their multiplication. The different steps through which milk passes might be compared to the links of a chain—if one is weak the strength of the whole chain is impaired; so if the care of milk is neglected at any step the care taken at other times may be rendered useless.

Brief references will be made to each step in the production and care of milk, from the herd to the delivery of the milk to the creamery, cheese factory, or train.

THE HERD.

The first requisite for pure milk is healthy cows. Any animal suspected of being sick or out of condition should be immediately separated from the herd and not allowed to remain near the dairy. If the milk from such animals is used it must first be boiled. On every dairy farm there should be proper place for keeping sick or suspected animals. It is absurd to claim that any large herd can be constantly maintained in perfect health, and when one finds a dairy farm with no provision for the care of sick animals, he has good cause to suspect that the milk from that place cannot be implicitly relied upon for its purity.

When a herd is known to be sound, every precaution should be taken before adding new animals. In one case carelessness in this respect resulted in the loss of about one hundred cows that had been in good health until a few fresh milkers, supposed to be also healthy, but later proved to be tuberculous, were introduced into the stable. The tuberculin test has proved to be a reliable means of ascertaining the presence of tuberculosis, and its use in any suspected herd is advisable. It does not injure the animals and may be the means of detecting cases that could not otherwise be found, but yet be a source of infection to sound animals. It should be applied only by a competent veterinarian, and after a herd has been tested no animals should be added to it unless known to be free from the disease.

There is little danger of a healthy cow giving abnormal milk if she is well cared for and not allowed to be excited, or unnecessarily disturbed. For this reason it is customary to have certain attendants always care for the same animals. But on some large dairy farms this practice is not followed, the claim being made that cows are satisfied with any attendant as soon as they become accustomed to frequent changes. No dog, unless it has been well trained, should be allowed in the pasture or barn yard, and the herd should never be driven rapidly to or from the pasture. If a cow is in the habit of hooking others she can usually be quieted by dehorning.

Bad effects of feeds may be avoided by changing them gradually and avoiding the use of those which give flavor to the milk—if the latter must be used, the best time is soon after milking. Cows may safely be allowed to graze in a pasture containing some garlic if they are stabled several hours before milking, and given dry feed. Such articles as turnips, onions, sour ensilage, etc., should not be stored in the stable, as their odor is imparted to milk through the air.

The proper time for commencing to use milk after calving is easily decided by its appearance and taste, and its behavior when boiled. Colostrum contains much more albumen than normal milk, and this coagulates into a solid mass when heated.

The cleaning of the cow is too often considered of small importance. Every milch cow should be carefully curried and brushed daily, and the udder and lower parts should always be brushed just before milking. Animals not accustomed to this care may object to it at first, but with gentleness and patience on the part of the attendants they soon learn to expect it and to stand quietly during the operation, which contributes to their own comfort. It is not enough to clean only the lower parts, leaving the back and sides; the work should be thoroughly done. Some dairymen groom their cows as carefully as horses are groomed in the best stables, their coats are kept smooth and shining, and one need never fear soiling his hands by touching them.

A stiff, open brush does good work in removing dry matter, but soft and damp manure should be scraped from the hips and flanks, and when necessary this should be followed by a washing or repeated washings. It is generally recommended to carefully wipe the udder, teats, and surrounding parts with a damp cloth just previous to milking. This is for the purpose of moistening the dirt and bacteria, which if left dry are apt to be shaken off during the milking. Washing or wiping the udder or in any way agitating it before being ready to draw the milk is objected to by some milkers, who believe that this action makes the cow think she is to be immediately milked, and when the attendant returns half an hour later the usual amount or quality of milk is not obtained. Not a few practical dairymen make a regular practice of cleaning all the udders before milking is begun and notice no bad effects. It is probable that cows become accustomed to the cleaning and learn not to expect to be milked until the milker appears with the pail. Care should be taken not to make the parts too wet or the impure water will drip into the pail; they should be only slightly dampened. It is also necessary to use care lest the cow take cold by being washed. The work of cleaning may be lightened by having the hair clipped about the udder and on the flanks, and by the use of clean bedding, not too fine.

The herd requires the most attention when continuously stabled. But it is almost as necessary to clean the animals when pastured as at other times, especially if they are permitted to wade in slimy pools. Wading in clean water is not objectionable, but cows should always be kept out of foul or sluggish water. The barnyard ought to be so well drained that stagnant pools of water are never seen there. If this is impossible, the pools should be fenced to keep the cattle out.

THE EMPLOYEES.

Contamination from attendants may be easily avoided. A dairyman should know the condition of health of every employee connected with his dairy, and of all the members of their households. If at any time a contagious disease appears, the patient should be excluded from the dairy premises and all communication between the house and dairy should cease until the danger is past. The same care should be taken to keep any person who has been exposed to a contagious disease away from the milk. Those working in a dairy should not enter a house where there has been a contagious disease until it has been properly disinfected.

The personal cleanliness of the attendants is often neglected. They should be clean in appearance and habits. Clothes and hands require special attention. Outer garments, used for dairy work only, should be worn, and they should be cleaned often. If a separate suit is kept for milking and is hung in the stable and never aired, it looks and smells badly and is soon worse than the regular work clothes. White material that can be washed is the best for dairy suits. The objection made against white goods that they show dirt quickly is really in their favor. When a suit is soiled it should show it and be cleaned. On model dairy farms the suits are washed daily; this is not a difficult task, as they never become much soiled and they may be rough-dried. A hat or cap should be used, to prevent hairs falling into the pail from the milker's head. If an entire special suit is not used when milking, one loose outer garment at least should be worn.

Just before milking the milker's hands ought to be washed. His finger nails should be clean, and they should be kept short and smooth at all times. An abundance of water and soap should be available and used. Some recommend washing the hands after each cow is milked; neglect of this has resulted in unconsciously carrying a disease, such as inflammation of the udder, to sound animals. Care must be taken not to let the hands touch the milk, as the skin always has more or less excretions on it, and these help to contaminate the milk. The hands should be kept dry, and if there are any sores they must be carefully covered before milking. Dirt and milk rubbed into an abrasion on hands or teats cause ugly sores. Smoking or any use of tobacco while milking should never be tolerated, and clothing impregnated with the odor of tobacco should be discarded.

THE STABLE.

The place where the herd is kept and its care are second in importance only to the health of the animals. Infection from stable air can be largely avoided by using special care in feeding and cleaning. The air should not be full of dust at milking time. Some advocate the use of a special room for milking only. The effect of milking in pure air is shown by an experiment in which a cow was milked in an open field on a damp morning when the air was clear, and it was found that her milk contained only a few bacteria in the same volume which, under ordinary conditions in the stable contains hundreds. No dusty food should be fed just previous to milking. If it is believed necessary for the cows to be eating at milking time, they may be given a moist feed then and the dry fodder used after milking. The animals and stables should be cleaned early and the stable well ventilated

before milking is commenced. In a light, dry building, in hot weather, it is well to sprinkle the floor to settle the dust and lower the temperature.

Moldy hay or straw must not be used for bedding cows, as the special bacteria which they carry are liable to produce harmful changes in the milk. Clean straw or new shavings make the best bedding. In many places dry shavings (figure 4) from planing mills can be obtained at a trifling cost; in some cases they are in such demand for this purpose as to be baled, shipped and sold for \$4 or \$5 a ton. Coarse stuffs for bedding are unsatisfactory, as they are usually poor absorbents and are uncomfortable for the animals and difficult to handle. No sensible dairyman will attempt to economize by using the refuse from the horse stalls for bedding cows. Clean sand is found to be a fairly good absorbent, but, like sawdust, it gets into the hair and makes extra work in cleaning.

FIG. 4.—Stable in which shavings are used for bedding. Pearson, *Farmers' Bulletin* 63, U. S. Department of Agriculture.

Cow stables should be kept clean all the time; a little attention once or twice daily is not sufficient. If the cows are kept continuously in their places, an attendant should pass through the stables several times a day and remove all droppings. When the herd is large, a boy or man may well be continuously employed for this purpose. This is more necessary than formerly, on account of the high feeding usually practiced and the consequent soft manure of disagreeable odor. It is well to make free use of land plaster for the purpose of absorbing moisture and undesirable odors, as well as increasing the value of the manure.

At certain periods, depending upon the thoroughness of the daily work, the stables should be given extra careful and complete cleanings. The following directions may appear formidable, but they call for nothing more than is frequently done in many model dairies. No nook or corner should be overlooked. All manure and fodder should be taken out, the six sides of every room swept, any rotten woodwork replaced, loose boards secured, dried accumulations about mangers, etc., removed, and the mangers scrubbed with hot water and soap, sal soda, or lye. If the floor is earth, it should be removed to a depth of a few inches and refilled with fresh material. After this work has been done, it is well to go over the walls, ceiling, floor, stalls, etc., with hot steam direct from a boiler. Such careful cleaning should be followed by a coat of whitewash, which may be applied quickly and satisfactorily with a spray pump. It acts as a disinfectant and makes the building lighter. Care should be taken to have it penetrate all cracks and crevices. Whitewash may be easily made by mixing sixty pounds of water with 100 pounds of quicklime. To each quart of this mixture five quarts of water are added. Salt or glue are sometimes used to improve the quality. It should be applied at least twice a year. A receipt for whitewash, recommended by the Light-house Board of the United States Treasury Department, and in successful use for many years, is as follows:

Slake half a bushel of unslaked lime with boiling water, keeping it covered during the process. Strain it and add a peck of salt, dissolved in warm water; three pounds of ground rice put in boiling water and boiled to a thin paste; half a pound of powdered spanish whiting and a pound of clear glue, dissolved in warm water; mix these well together, and let the mixture stand for several days. Keep the wash thus prepared in a kettle or portable furnace, and when used put it on as hot as possible, with painters' or whitewash brushes.

Disinfection.—When milk has a strong taint at the time it is drawn, the trouble is usually not due to bacteria, and it can be improved by aeration. But when it is natural at first and gradually becomes more and more tainted the longer it is held, bacteria are probably to blame, and if the dairy is badly infected with them energetic measures are often required to get rid of them. If the affected milk is not harmful to health, but only objectionable on account of its smell or taste, its entire loss may be made unnecessary by pasteurizing or sterilizing it as soon as possible after it is drawn and before much of a change has been made, and then using it immediately or keeping where further infection can not take place. But this treatment does not affect the source of the trouble, and if that is not overcome by sterilizing all utensils and practicing scrupulous cleanliness everywhere, the disinfection of the stable or the killing of all the germs must be undertaken. Disinfection is also necessary if cattle have been affected with a contagious disease, and it should be done as soon as the last case is cured or removed and before other cattle are added to the herd. While the germs of some diseases are delicate and can live only a short time outside the body of their host, others are hardy and retain their vitality for months or years. Sunlight is a great purifier and should be admitted in abundance. The same may be said of fresh, pure air. Both of these aid in disinfection.

Whitewash partially serves the purpose of disinfection; it should soon follow other agents which are employed when more thorough work must be

done. Before disinfection, the stable should be carefully cleaned as above detailed, and any fodder which may have been stored where it was exposed should be destroyed.

Chemical disinfectants are efficient for thorough work. Most of these are poisonous and must be handled with great care. The cost is an important consideration in the selection of disinfectants for cheap buildings. The following are comparatively inexpensive: Bichloride of mercury or corrosive sublimate, in the proportion of one part to 1,000 of water, or one ounce to eight gallons of water, is an effective agent. The poison should first be dissolved in a small amount of hot water and then diluted; it may be applied with a brush or as a spray. One pound of chloride of lime to three gallons of water is another effective disinfectant. Carbolic acid is well known; it should be used in the proportion of 1 part to 20 of water.

Sometimes it is best to use a gas as a germicide. In this case no animal nor person can remain in the inclosure being disinfected. It must be tightly closed so there will be no leaks through cracks or other openings. When sulphur is burned the building is soon filled with its fumes. A considerable quantity should be supplied and fresh air excluded for twenty-four hours, to give full time for the gas to penetrate into every place where the germs may be lodged. Chlorine gas is a more powerful disinfectant. It is generated by chloride of lime and muriatic acid. The fumes are very deadly, and great care must be taken not to inhale it. Formaldehyde is an efficient germicide which has recently come into use; it is a gas generated by special apparatus; it may also be applied in a solution.

One of the best and cheapest disinfectants for floors, gutters, waste pipes, etc., is sulphate of iron (copperas). For a floor, as much of this should be dissolved as water will hold; it is then applied with a sprinkler. Lumps of dry copperas are useful for purifying drains.

After a stable has been disinfected it should be allowed to remain empty for several days for thorough airing.

Construction of the stable.—The construction of the stable has an important influence on the health of the cattle which it shelters, the way they are cared for, and the degree of cleanliness that exists. Unhandy, inconveniently arranged buildings are often the cause of much which should be done being left undone; especially is this true of the work of cleaning. The stable should be well located, and planned to facilitate the work of caring for the herd and to contribute to its comfort and well-being. Light and fresh air are essentials, and should be admitted in abundance.

A hard, smooth material which does not absorb liquids and has no cracks, is the best for the stable floor. The stalls should be comfortable, not too long nor too short, and the gutters in the rear should be open, shallow, and with sufficient incline to carry off the liquid manure. High mangers are objectionable; some farmers feed on the floor to avoid mangers (figure 5). Every stable should be as simply constructed as possible. (See Farmers' Bulletin No. 55, United States Department of Agriculture, The Dairy Herd: Its Formation and Management.)

THE DAIRY HOUSE.

The location of a dairy house, or room, must be carefully selected. On some farms it is found convenient and not objectionable to have it adjacent

to or very close to the stable. It should be placed where it will not be reached by odors from the barnyard, and should be separated from the room in which the cattle are kept by two doors, or situated so it will be necessary to pass out of the stable before entering the dairy room. Special attention must be given to facilities for drainage. It is necessary to carry the waste a considerable distance from the building. An attempt should be made to keep the surroundings dry. The room should be thoroughly dried out, in all its parts, at least once a day. If shelves are of wood, they should be painted. The greatest care must be taken to keep all surroundings clean from fermenting or decaying milk, as well as other forms of dirt;

FIG. 5.—Well-built stable arranged for floor feeding. The watering troughs are lowered when needed. Pearson, *Farmers' Bulletin*, 63, U. S. Department of Agriculture.

even sour milk ought not to be allowed to remain in the dairy room where there is other milk which should be kept sweet.

*Utensils.**—It is a mistake to purchase poor utensils or to keep them after they are badly worn. New cans and pails are frequently the cheapest means of improving the output of a dairy. In the selection of appliances great care must be taken to get those which are simply constructed and can be easily cleaned. Pails, strainers, cans, and dippers—in fact everything that comes in contact with the milk—should be well made, and there should be as few places for germs to attach themselves as possible. Vessels for holding milk should be made of a hard, smooth material. Wood is not adapted to this purpose. Many small utensils are now made of pressed tin and are free from seams.

The cleaning of every dirty utensil should be done promptly and thoroughly, first using cold or slightly warm water for rinsing, then hot water

*This subject is discussed at length in an article entitled "Care of Dairy Utensils," in the Yearbook of the U. S. Department of Agriculture for 1906. It has also been printed in separate form.

with a cleaning preparation, then clean hot water for rinsing, and finally boiling water or steam for sterilizing. Straining and wiping cloths also require careful attention. Of the special preparations for aiding in cleaning, sal soda or washing soda is one of the best. It would be a convenient arrangement for patrons of a creamery or factory to be supplied with this where their milk is delivered; they might also be furnished with brushes, strainers, pails, etc., at the same place, at cost price.

Boiling water is a satisfactory sterilizing agent, but heat must be almost continuously applied or the temperature will quickly fall to a point below which bacteria are not killed. Steam is a more effective sterilizing agent, and if there is much of this work to be done, a small steam generator will be found useful. If a feed cooker is located close to the dairy, its boiler may serve to supply all the steam that is needed. It is an excellent practice to have cans cleaned and sterilized at the factory, where arrangements for such work can be made. After being cleaned, utensils must be kept in clean places and in pure air.

Water.—A supply of good water is of the greatest value to a dairy. Spring or well water which comes from a considerable depth is the best, as it is the most free from micro-organisms and is cold. Careful attention should be given to protect the water supply from the entrance of surface water, which is always rich in bacterial life, and is especially liable to get into the well or spring during the rainy season. It is also important to make sure that the supply is not contaminated by drainage from residences. The well should be located at a distance from any piles of filth or other contaminating influences; it is advisable to have the water examined occasionally by a bacteriologist. State and local boards of health make such examinations. A good way to help keep a well pure is to use from it freely; the water should never be allowed to become stale. Water is not purified by freezing, so if ice has been cut from a stagnant pond, or is formed from impure water, care must be taken to keep it from coming in contact with dairy products.

MILKING.

Milking is an operation which requires skill, as it has an important effect on the amount and quality of milk given. Dairymen know that there are as great differences between milkers as between cows, and that cows will do much better with some milkers than with others. Indeed, good cows are often almost ruined by poor milkers.

The milker should avoid handling the cow more than necessary, and he should make it a rule to do his work quickly and thoroughly. He should never go from a sick to a well cow without first cleansing his hands. The habit of wetting the hands with milk is filthy in the extreme and should never be practiced. Some people think it is necessary, but this is a mistake. The hands should be kept dry. If they are not, it is impossible to prevent drops of milk from constantly falling from them into the pail.

The pail should be held close to the udder, so as to expose the milk to the air as little as possible. The farther the streams fall, and the more they spray, the more dirt and bacteria they collect. Contamination from the foremilk may be avoided by discarding the first few streams drawn, or

less than a gill in all. This entails little loss, as the first milk drawn is always poor in butter fat, and if it happens to be badly contaminated, as is frequently the case, much injury and trouble may be saved.

Milkers should be constantly on the lookout for unnatural milk, and when it is discovered, it should not be mixed with the rest, but boiled and fed to stock, or thrown away.

REMOVAL OF MILK FROM THE STABLE.

Milk must be removed from the stable as soon as possible after it is drawn to avoid germs and characteristic stable odors which it readily absorbs. It is not uncommon to see a large can placed in the passage way between the cows, where it is slowly filled and allowed to remain until the cows are turned out and the chores finished. It may be more than an hour from the time the first milk was drawn until it is cooled. Such delay must not be allowed if it is expected to keep the milk in good condition. Each pail, as soon as it is filled, or when the milking of any cow is finished, should be carried to the dairy room. If a dairy house is located at a distance from the stable, the cans should be taken to it as soon as they are filled; and they should not be so large as to require a long time for filling. When there are many milkers and large cans are used, the cans may be carried to the dairy house by suspending them on a skeleton frame between two wheels, or they may be sent across on a cable stretched from the barn to the dairy house.

STRAINING.

If milk could be drawn in such a manner that no dust or dirt fell into it straining would be needless. But this is impracticable, and it is necessary to remove foreign matter by some mechanical means. The sooner milk is strained the better. It should pass through a metal strainer having a fine mesh and a flannel cloth or cheese cloth folded enough to prevent running through too fast. Both the cloth and metal strainer ought to be frequently rinsed during the milking to avoid gumming and to wash away fine particles of dirt removed from one pail which might be later carried through, leaving the milk as badly infected as it would have been if not strained. The dirt should be removed from the milk so completely that when the milk is again strained at its destination there will be no cause for returning the cloth through which it passed to show to the dairyman the dirt collected.

Milk pails are sometimes used whose tops are covered with tin, the center of which is replaced by a circular piece of wire gauze about seven inches in diameter, through which the streams of milk pass. This form of pail is of advantage in keeping out hairs or large pieces of dirt. When the milk is emptied from these pails it should be passed through a cloth, and the pail and its strainer should be rinsed. The common strainer pail should not be used in the stable. It offers no special protection to the milk and may even collect dirt that would otherwise be avoided.

The common strainer used over cans has flaring sides and a concave bottom, the wire gauze being in the center of the bottom. This only partially serves its purpose. It removes coarse materials, but holds them in the

milk stream, and the soft impurities which are easily broken up by agitation and soaking, may be forced through the small openings by the constant current of milk.

Numerous improved forms of strainers are now made, and some of them are very simple, and effectively overcome the objection to the old style.

In the pyramidal form (Fig. 6) the center of the metal gauze is raised and the straining surface is much increased; impurities striking against it work down until out of the current. Others are so arranged that the milk is rising when it passes through the gauze (Fig. 7) and dirt held back falls to the bottom of a settling chamber. A layer of cotton between two pieces of cheese cloth and pieces of wire netting to keep it in place, removes many fine particles which escape other materials. Cotton is cheap, and when much

FIG. 6.—Pyramidal strainer. Pearson; Farmers' Bulletin 53, U. S. Department of Agriculture.

milk is handled one can easily afford to use it once and throw it away. Sand and gravel are used as strainers or filters, but special care must be taken to thoroughly clean and sterilize them. Filters are also used, the milk being forced through them by pressure.

When passing through the strainer large surfaces of the milk are exposed; hence it is important to do this work in a pure atmosphere.

AERATING THE MILK.

Aeration of milk is its exposure to the air for the purpose of removing "animal odor" or other taint. It is generally regarded by milk shippers and other handlers of milk as a useful operation. The benefit derived from aeration depends on how much the milk is tainted or "off." The product of a healthy cow, obtained with due regard to cleanliness and feeding, has little or none of the "cowy" odor. But it is different when the cow is slightly out of condition, is illy kept, or has been given some strongly smelling food previous to milking; then aeration has a beneficial effect, and although the taint is not entirely removed, it is reduced. It is of use chiefly in removing odors absorbed from the air or from food eaten by the cow; both these are strongest when the milk is first drawn, while those caused by bacteria are least noticeable when the milk is fresh, and increase when it is held.

Milk is said to be "smothered" when it is tightly closed in a can immediately after milking, without cooling or the removal of the gases which

FIG. 7.—Strainer in which the milk is rising as it passes through the gauze. Pearson; Farmers' Bulletin 53, U. S. Department of Agriculture.

it contains. When thus treated it soon becomes unfit for use. Cans with holes in their lids are used to prevent this trouble, but ventilation is unnecessary if aeration is practiced. All taint should be out of the milk before the lid is put in place.

Aerating does not have a marked effect on the keeping quality of milk; its benefit is in removing undesirable odors. Some persons of sensitive taste can not drink unaerated milk, but relish it when aerated. The operation is done with varying success in several different ways. Usually the milk is cooled more or less at the same time it is being aerated, and it is due to this that its souring is retarded. Actively stirring or agitating milk serves to partially aerate it, and this should always be done if arrangements for more thorough work are not at hand. A better method is to dip from the can a few quarts and pour it back slowly from a height. This should be repeated many times, depending upon how much taint there is and the quantity of milk; or the milk may be poured from one vessel to another with the same effect. Still more thorough work is accomplished by allowing it to fall through the air in fine streams or a spray. A milk pail with small punctures in the bottom and held a few feet above a larger receptacle answers for this purpose. Special apparatus is made to operate in the same way.

By other contrivances the air is carried to the bottom of the vessel, whence it rises through the milk in bubbles, bringing out with it the objectionable gases, until they are mostly removed. This requires from one to five minutes, and is done by a concave plunger or by a pipe and bellows. With the latter arrangement air can be filtered through cotton to free it from impurities before it is introduced into the milk. Certain aerators are constructed so that the milk passes over them in a thin layer and is thus exposed to the air. These are referred to in connection with cooling.

Here again the necessity of fresh, pure air must be emphasized. It is better to omit aeration entirely than to attempt it in a stable or a close, foul place. As with other work in the dairy, promptness is necessary in aerating if best results are sought. The aerator should be large enough to care for the milk as fast as it is brought from the cows. Even though it may be intended to use the morning's milk immediately, it should be aerated the same as night's milk.

Experiments conducted by private enterprise seem to show that even the strong odor of garlic, which gives so much trouble and causes great losses in certain districts every spring and fall, can be entirely removed by heating milk and aerating it while hot. It is explained that the volatile oil, carrying the disagreeable odor, is liberated by heat and carried away by the fresh air. This process necessitates the pasteurization of the milk, which is far less objectionable than having a garlic flavor in the butter, and may even be beneficial to the product.

Much taint can be prevented by cleanliness. The so-called "animal" or "cowey" odor is generally to be attributed, not to natural milk, but to the exterior of the cow from which it is taken, or to the unclean person who does the milking, or to filthy surroundings where the milking is done. Aeration is a means of only in part overcoming these neglects.

COOLING OF MILK.

When milk is for cheese or butter making and is to be soon used or promptly delivered at the factory, it may be cooled sufficiently by thorough aeration on the farm. But if it is not at once hauled away or is not to be immediately separated or set for cream, or must be carried a long distance, or is to be used in its natural form as food, fermentation must be checked by low temperature. Cooling is the only important operation in the dairy which should ever be modified, and then only under the conditions named. It is often stated that milk does not require so much care when it is to be used for butter or cheese making as when it is to be sold at retail. This is

true in a way, only as far as the cooling is concerned, and it is very misleading. First-class butter or cheese cannot be made from inferior milk; for the factory, milk should be drawn and handled with all the precautions against contamination, the same as if it were to be sold at retail; but it need not be held at a temperature so low that the germs of lactic acid cannot increase. A certain amount of acidity is necessary for cheese or butter making, and this may be allowed to partially develop in the milk before it leaves the farm without harm to the product. Some cheese makers prefer that the temperature never be allowed to go below 60 degrees Fahrenheit.

FIG. 8.—Milk cooler for use with running water.
Pearson, *Farmers' Bulletin*:63, U. S. Department of Agriculture.

The lower the temperature to which milk is cooled and held, the longer it can be kept in good condition.

It is the custom of some dairymen to serve their customers soon after milking and without first cooling the milk. In such cases it is impossible for it to long remain sweet, and within a few hours it undergoes more change than milk usually sold in cities; this is because the latter was promptly cooled and kept cold, although it may have been one or two days old when delivered.

It is hardly necessary to emphasize the importance of prompt and rapid cooling when the rate at which germs multiply in warm milk is understood. The milk from one cow should be cooled while that from the next is being drawn. This is good for the milk, and it saves a tiresome delay of waiting for it to cool after all the milking is completed. It is not sufficient to set a can in a cold place and allow it to cool slowly; this requires several

hours and gives time for the germination of spores and the development of bacteria. In order to get full advantage of low temperature the cooling must be completed at the earliest possible moment, and it should be carried down to about 40° F. At temperatures above 40° F. and below 60° F. some species of bacteria thrive, though they do not cause as much trouble or loss as those which grow at still higher degrees. Milk from dairies where cooling is not practiced is frequently sour or tainted when it arrives at the factory; in such cases cooling is a preventive needed, and the labor necessary will be well repaid by the better product.

A common way of cooling is to place the can in a trough or vat of water and stir the milk; this is a tiresome operation, and the work is liable to be slighted; if the can is only half filled the temperature falls faster than when it is full. Putting ice into the milk must be done with caution; water is thus added, and there is danger besides of adding many impurities and germs which are not destroyed by freezing.

Cooling is so closely connected with aeration that the terms are often confused. Machines are constructed for the double purpose of performing both these operations at the same time. These are more efficient than setting in water and occasionally stirring by hand, and they are not very expensive. Milk may be cooled by such contrivances from 30° to 40° in a few minutes. Coolers having a current of water running through them (figure 8) at the same time milk is running over the outside, cool the milk to within 3° or 4° of the temperature of the water; such thorough work requires several times as much water as the bulk of milk. The best results are obtained when the cooling agent

enters the cooler at the bottom and leaves at the top, so the milk is partly cooled before it receives the effect of the coldest water. Where running water is not available, a form of cooler is used which holds a volume of water to which ice has been added (figure 9). A cooler should be simply constructed, having all parts easily accessible for cleaning.

It is desirable for every dairy farm to have a never-failing cold spring, a good well, or a supply of ice, so that means for cooling milk will

— Fig. 9 Milk cooler for use with a volume of water, not running, and ice. Pearson, *Farmers' Bulletin* 63, U. S. Department of Agriculture.

always be at hand. If ice is stored near the milk room and the business is large enough to justify the arrangement, a circulation of brine through pipes below the ice and through the milk cooler may be arranged, the cold brine being forced about the circuit by a pump. The drippings from the ice may also be used. The cooling of milk should receive the same attention in winter as in summer.

STORING OF MILK.

A large proportion of the milk delivered to factories is first held on the farm from twelve to twenty-four hours and sometimes two or three days, and the conditions under which it is stored during this time have an important influence on its quality. Low temperature does not kill bacteria; it only renders them torpid and they regain their activity as soon as they are again surrounded by warmth; therefore it is as necessary to *hold* the milk at a low temperature as to cool it in the first place. As in cooling, for certain uses of the milk, very low temperatures are unnecessary, it should not be allowed to freeze.

The usual way of storing milk is to set the cans in tanks of cold water. Care must be taken to have at least three times as much water as milk and to have it higher on the outside of the cans than the milk is inside. If the milk is higher than the water a thin layer on top is not cooled so much as the rest, fermentation progresses there, and as soon as the can is moved this layer is disturbed and distributes a supply of bacteria through the remainder. The tank should be covered to confine the cold air, and when necessary, ice should be placed on the cans and in the water. If it is attempted to keep the cans cold by placing blocks of ice on them when grouped on the floor, a blanket should be thrown over them. When delivery is not made for thirty-six hours, as on account of holding over Sunday, the milk should be held at a lower temperature than when delivered within twelve or fifteen hours.

In order to prevent the absorption of odors by milk, the place where it is kept must be free from any objectional smell. Cold milk absorbs odors very rapidly. Water in the tanks must be kept sweet by frequent changes, and the shelves, walls, and floor must always be clean. Covers of the cans may be left on or off, but if there is any danger of contamination, the cans should be closed tightly after the milk gets cold.

Evening and morning milk should not be mixed, especially when the fresh milk has not been cooled. If this is done, the whole lot soon spoils. In order to insure the same quality of milk in each can, large tanks are frequently used for mixing all the milk of one milking. This is a matter of some importance when a sample from one can is used for determining the value of the lot, or when the milk is sold at retail.

The use of preservatives is mentioned at length in Farmers' Bulletin No. 42, U. S. Department of Agriculture, "Facts About Milk." Some of them are dangerous to the health of the consumer, and any of them may be harmful if taken regularly in milk. They are prohibited by some state laws, are condemned by leading authorities, and should not be used.

When milk or cream is shipped, it is sometimes desirable to seal the cans; this may be done by means of a wire passing through a hold in the

edge of the lid and the handle, the ends secured by a lead seal, similar to those used on doors of freight cars. The seal presses are sold by dairy-supply firms.

Milk is also sometimes shipped in glass jars in cases, ready to be served to city customers; if properly iced, it does not suffer from exposure to the heat during transit. The jars and packages necessary to carry them are heavy and expensive, but the system has many advantages. Special machines are made by which several jars are filled at the same time.

SKIMMING OF MILK ON THE FARM.

There are great objections to having to care for on the farm and haul to the factory, a large bulk of milk, when only the cream is needed, and any system which does away with the seemingly useless labor of handling eight or ten pounds for the delivery of one, will be most welcome. In the season of bad roads it is difficult to carry large loads of cans, and sometimes it is impossible to transport milk to the creamery when cream alone might be carried. Besides the advantage of having to haul only a small amount instead of a large amount, it is an advantage to have cream removed on the farm, so that skim milk may be fed when fresh. The gathered cream system with deep-set milk gives these results only partially.

The plan of having small separators on the farms of patrons is being tried in some districts. The skim milk is thus made immediately available for feeding, and the cream alone needs to be cooled, cared for, and hauled. This system appears to be excellent in certain cases, but just how widely it can be profitably adopted is not yet shown. Experiments in this line will be watched with interest. It is a natural development of the cream-gathering plan, and if successful will be widely adopted. It will do away with the return to the farm of the spoiled contents of a filthy skim milk tank, as well as the sometimes heated discussions as to how much skim milk belongs to the different patrons. But the most important advantage will be the use on each farm of its own skim milk while fresh and sweet. The chance of young stock taking a disease which may be on a distant farm, whence the germs may be delivered to the creamery and carried away in the skim milk to other farms, is also avoided.

If the milk is to be set for cream, it should be aerated and set when warm. This should be done as soon as the milk is strained. If a machine is used, aeration takes place while it is passing through the separator. Unless it is desired to ripen the cream immediately it must be promptly cooled.

HAULING TO THE FACTORY.

If milk is sold off the farm, the dairyman's care of it does not cease until he has delivered it to the factory or other destination, and then he has a right to insist that it be properly handled, if he is interested in the success of the concern which uses his product.

Milk should be hauled in spring wagons and the cans filled full to prevent churning while on the road. Much trouble is caused by allowing it to stand an indefinite period on a platform in the heat, waiting for the collector; the storage tanks should be placed so it will not be necessary to remove the cans from the water until the wagon is ready to start. A piece of canvas or a blanket thrown over the load, protects the cans from dust

and extremes of temperature. In hot weather it is an excellent plan to wet the cloth so that the air underneath will be cooled by evaporation. Padded jackets which slip over separate cans and protect the tops and sides are commonly used when cream is shipped in hot weather. Cheap burlap bags of the proper size, with holes cut for the handles of the cans, may be used to advantage to protect milk from heat during shipment; these covers should be thoroughly wet with cold water.

It is doubtful economy to hold milk in warm weather for every-other day delivery; some factories require delivery twice a day in the hottest weather. In summer it is well to haul at night to avoid the hot sun. It is important to haul the milk in a clean wagon and to have nothing else in the load that could contaminate it.

Waste products should not be returned to the farm in the same cans used for delivering milk; other vessels should be provided for this purpose. If such hauling is unavoidable, consequent trouble can be reduced by having the skim milk or whey pasteurized or sterilized by boiling, and by keeping the tank clean. Patrons should insist that tanks for waste products be thoroughly cleaned daily.

FIFTY DAIRY RULES.*

The following rules are based on the preceding text, and briefly summarize the subject discussed:

THE OWNER AND HIS HELPERS.

1. Read current dairy literature and keep posted on new ideas.
2. Observe and enforce the utmost cleanliness about the cattle, their attendants, the stable, the dairy and all utensils.
3. A person suffering from any disease, or who has been exposed to a contagious disease, must remain away from the cows and the milk.

THE STABLE.

4. Keep dairy cattle in a room or building by themselves. It is preferable to have no cellar below and no storage loft above.
5. Stables should be well ventilated, lighted, and drained; should have tight floors and walls and be plainly constructed.
6. Never use musty or dirty litter.
7. Allow no strong smelling material in the stable for any length of time. Store the manure under cover outside the cow stable and remove it to a distance as often as practicable.
8. Whitewash the stable once or twice a year; use land plaster in the manure gutters daily.
9. Use no dry, dusty feed just previous to milking; if fodder is dusty, sprinkle it before it is fed.
10. Clean and thoroughly air the stable before milking; in hot weather sprinkle the floor.
11. Keep the stable and dairy room in good condition, and then insist that the dairy, factory, or place where the milk goes be kept equally well.

THE COWS.

12. Have the herd examined at least twice a year by a skilled veterinarian.
13. Promptly remove from the herd any animal suspected of being in bad health, and reject her milk. Never add an animal to the herd until certain it is free from disease, especially tuberculosis.

*These rules are printed on one side of a large cardboard for posting in stables and dairy rooms, and will be sent in this form to persons applying for them.

14. Do not move cows faster than a comfortable walk while on the way to the place of milking or feeding.
15. Never allow the cows to be excited by hard driving, abuse, loud talking, or unnecessary disturbance; do not expose them to cold or storms.
16. Do not change the feed suddenly.
17. Feed liberally, and use only fresh, palatable feed stuffs; in no case should decomposed or moldy material be used.
18. Provide water in abundance, easy of access, and always pure; fresh, but not too cold.
19. Salt should always be accessible.
20. Do not allow any strong flavored food, like garlic, cabbage, and turnips to be eaten, except immediately after milking.
21. Clean the entire body of the cow daily. If hair in the region of the udder is not easily kept clean it should be clipped.
22. Do not use the milk within twenty days before calving, nor for three to five days afterwards.

MILKING.

23. The milker should be clean in all respects; he should not use tobacco; he should wash and dry his hands just before milking.
24. The milker should wear a clean outer garment, used only when milking, and kept in a clean place at other times.
25. Brush the udder and surrounding parts just before milking, and wipe them with a clean, damp cloth or sponge.
26. Milk quietly, quickly, cleanly, and thoroughly. Cows do not like unnecessary noise or delay. Commence milking at exactly the same hour every morning and evening, and milk the cows in the same order.
27. Throw away (but not on the floor, better in the gutter) the first few streams from each teat; this milk is very watery and of little value, but it may injure the rest.
28. If in any milking a part of the milk is bloody or stringy or unnatural in appearance, the whole mess should be rejected.
29. Milk with dry hands; never allow the hands to come in contact with the milk.
30. Do not allow dogs, cats, or loafers to be around at milking time.
31. If any accident occurs by which a pail full or partly full of milk becomes dirty, do not try to remedy this by straining, but reject all this milk and rinse the pail.
32. Weigh and record the milk given by each cow, and take a sample morning and night, at least once a week, for testing by the fat test.

CARE OF MILK.

33. Remove the milk of every cow at once from the stable to a clean, dry room, where the air is pure and sweet. Do not allow cans to remain in stables while they are being filled.
34. Strain the milk through a metal gauze and a flannel cloth or layer of cotton as soon as it is drawn.
35. Aerate and cool the milk as soon as strained. If an apparatus for airing and cooling at the same time is not at hand, the milk should be aired first. This must be done in pure air, and it should then be cooled to 45 degrees if the milk is for shipment, or to 60 degrees if for home use or delivery to a factory.
36. Never close a can containing warm milk which has not been aerated.
37. If cover is left off the can, a piece of cloth or mosquito netting should be used to keep out insects.
38. If milk is stored, it should be held in tanks of fresh, cold water (renewed daily), in a clean, dry, cold room. Unless it is desired to remove cream, it should be stirred with a tin stirrer often enough to prevent forming a thick cream layer.
- 39. Keep the night milk under shelter so rain can not get into the cans. In warm weather hold it in a tank of fresh, cold water.

40. Never mix fresh warm milk with that which has been cooled.
41. Do not allow the milk to freeze.
42. Under no circumstances should anything be added to milk to prevent its souring. Cleanliness and cold are the only preventives needed.
43. All milk should be in good condition when delivered. This may make it necessary to deliver twice a day during the hottest weather.
44. When cans are hauled far they should be full, and carried in a spring wagon.
45. In hot weather cover the cans, when moved in a wagon, with a clean wet blanket or canvas.

THE UTENSILS.

46. Milk utensils for farm use should be made of metal and have all joints smoothly soldered. Never allow them to become rusty or rough inside.
47. Do not haul waste products back to the farm in the same cans used for delivering milk. When this is unavoidable, insist that the skim milk or whey tank be kept clean.
48. Cans used for the return of skim milk or whey should be emptied and cleaned as soon as they arrive at the farm.
49. Clean all dairy utensils by first thoroughly rinsing them in warm water; then clean inside and out with a brush and hot water in which a cleaning material is dissolved; then rinse and lastly sterilize by boiling water or steam. Use pure water only.
50. After cleaning, keep utensils, inverted in pure air, and sun if possible, until wanted for use.

XXI.

MEATS—COMPOSITION AND COOKING.*

LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF EXPERIMENT STATIONS, }
WASHINGTON, D. C.

SIR—I have the honor to transmit herewith, for publication as a farmers' bulletin, an article on the composition and cooking of meats, prepared under the immediate direction of Prof. W. O. Atwater, special agent in charge of nutrition investigations, by Mr. Chas. D. Woods, vice-director of the Storrs (Conn.) experiment station, and attached to this office as an expert for nutrition investigations. This bulletin summarizes the results of investigations regarding the nutritive value of different kinds of meat, and points out some of the things which should be considered in the cooking of meats for different purposes. The table appended to this article is based upon all the available data regarding the composition and fuel value of American meats, and it is believed to be more complete than any similar table hitherto published. Respectfully,

HON. J. STERLING MORTON,
Secretary.

A. C. TRUE,
Director.

ANIMAL AND VEGETABLE FOODS COMPARED.

The food of man cannot be healthful and adequate unless it supplies the proper amount of the different nutritive ingredients, or "nutrients." Practical experience proves this, and experimental inquiry demonstrates it as well. Just what the functions of the different foods are—their "nutritive value and cost" has been discussed in Bulletin No. 23 of this series, and a knowledge of the facts there set forth is necessary to a clear understanding of the present bulletin.

It is natural to divide foods into two classes—animal food and vegetable food. Not only is this division simple and convenient, as pointing out the two great sources of man's food, but the classification is a true one, for the difference between animal and vegetable food is very striking in appearance, composition and value in the economy of life. It is true that many of the chemical compounds which enter into the composition of these two classes of food are either alike or quite similar; but in general the vegetable foods contain large amounts of carbohydrates—such as sugar, starch, woody fiber, etc.—while the animal foods, and meat in particular,

* By Chas. D. Woods. Farmers' Bulletin 84, U. S. Department of Agriculture.

contain only small amounts of these carbohydrates. As regards the fats and nitrogenous matters, or "protein," the case is reversed; for vegetable foods have comparatively little of these two classes of nutrients, while meats have relatively very large amounts.¹

The value of meats as food, therefore, depends on the presence of two classes of nutrients, protein and fat. The protein is essential for the construction and maintenance of the body. Both protein and fat yield muscular power and maintain the temperature. It is possible to combine the fat of animal foods with the protein so as to meet the requirements of the body without waste, but the vegetable foods contain nutrients more especially adapted for the production of energy.

Another difference between animal and vegetable foods is in their digestibility. The compounds contained in the animal foods are, of course, very much like those of our bodies, and therefore need but little change before they are ready for use. The vegetable compounds, on the other hand, require much greater changes before they can be assimilated. They are less readily and less completely digested than the animal foods. This is due in part to the fact that the nutrients of vegetable foods are often enclosed in cells with woody walls, which resist the action of the digestive fluids, and in part to the action of the woody fiber in irritating the lining of the intestine, and thus hastening the food through the intestine before the digestive juices have time to act thoroughly upon the food. Indeed, the presence of the woody fiber frequently prevents the complete digestion and absorption not only of the nutrients contained in the vegetable foods, but also of those contained in the animal foods eaten at the same time.

STRUCTURE OF MEATS.

In the sense in which the word is here used, meat consists of the muscular tissue, or lean, and the varying quantities of fat which are found in the different parts, as between and within membranes and tendons. Besides the fat ordinarily visible there is always present more or less of fat in particles too small to be readily distinguished from the lean which surrounds it. These particles can, however, be readily obtained by chemical methods in quantities sufficient to be seen and weighed.

The lean part of meat has practically the same final structure regardless of its kind and its muscular tissue. All muscular tissue is made up of prism-shaped bundles, which can be divided into smaller and smaller bundles, until finally the muscle fibers or tubes are reached. These irregular tubes are so small that they are invisible to the unaided eye. They vary in diameter from $\frac{1}{100}$ to $\frac{1}{1000}$ of an inch.

These muscle fibers or tubes are held together in bundles by means of connective tissue, and the invisible fat is stored between and inside the different fibers and bundles of fibers. Each of the bundles of muscle fibers, seen when a piece of meat is cut "across the grain," as in a round steak, is made up of hundreds of the muscle tubes.

The envelope or wall of each tube is a very delicate, elastic membrane, composed of nitrogenous material. The walls themselves are quite permanent, but their contents are continually undergoing change and renewal.

¹ See explanations of classes of nutrients, p. 23.

COMPOSITION OF MEATS.

As regards composition, the meats found in the markets consist of the lean or muscular tissue, connective tissue or gristle, fatty tissue, blood vessels, nerves, bone, etc. No general statement can be made with regard to the proportion in which these substances occur, as it is found to vary greatly with the kind of animal, with different "cuts" from the same animal, and with many other conditions.

Refuse, as bone, skin, etc.—Nearly all meats bought and sold in the markets contain some portion not suitable for eating, which may properly be designated as refuse. Some of these, as bone, contain some nutriment, and may be utilized to a greater or less extent in making soups, and perhaps in some other ways; but for the most part they are thrown away.

It is important to distinguish between refuse and "waste." As the term is ordinarily used, any portion considered unsuitable for eating would be designated as refuse. At another time or under other conditions, it might be desirable to use for food the portion which was before considered useless. Such portions, therefore, are not refuse in the proper meaning of the term. They are waste. Some parts of meat, however, from their lack of nutrients or from the impossibility of preparing them for food, are and always will be useless, and these portions we may properly call refuse. As population increases there is, however, an increasing tendency to utilize portions of meats which have hitherto been thrown away. If our classification is to be a true one, therefore, we must narrow the use of the term "refuse" from its generally too-broad application and must cover much of its popular meaning by the term "waste." The skin of fish and poultry, "rind" of pork, case of sausages, etc., are illustrations of materials which might by one person be classed as refuse while by another be considered edible and thus be classed as waste if they were rejected at the table.

In ordinary meats the chief refuse is bone. The percentage of bone varies so greatly that no precise statement can be made. In many species of fish, bone constitutes more than one-half the dressed weight. In some cuts of meat, on the other hand, notably the round of beef, slice of ham, and similar cuts in other animals, there may not be more than 2 or 3 per cent of bone, and in still other cuts, as shoulder clod, there will be no bone at all.

In general, the younger the animal the larger the relative proportion of bone, and with increase in fatness there is a relative decrease in the amount of bone.

The following diagram shows graphically the variations in the refuse, chiefly bone, in different kinds and cuts of meat:

The smallest and largest percentages of refuse found in different kinds and cuts of meats.

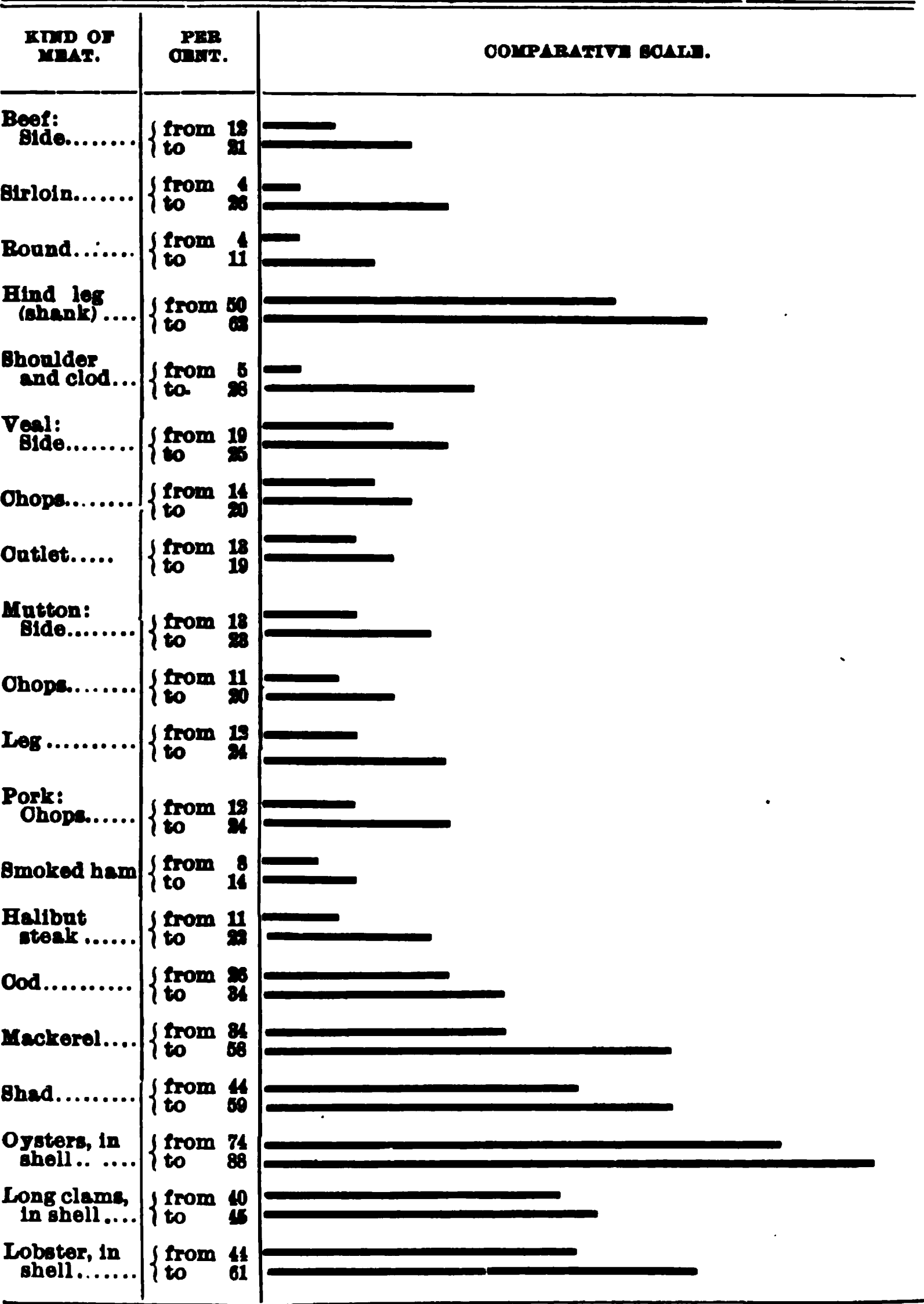


DIAGRAM NO. 1.

Water.—Meats contain large and varying amounts of water. For the purpose of mastication, swallowing, etc., of course this is better than if the meat were dry; but the water contained in flesh has no greater value as food than other water. From this it follows that the greater the amount

of water in a given weight of food the less is its relative nutritive value, for it will contain a less quantity of nutritive material. Fish and oysters have relatively more water than most other meats. In general, the greater the amount of fat in a given cut the less is the amount of water. For instance, a lean cut of beef may have 75 per cent of water, while a fat cut from the same animal may not contain more than 50 per cent.

Diagram No. 2 illustrates the variations in the quantity of water in the edible portions of different kinds and cuts of meats.

Fats.—All meats contain some fat, partly stored in quantities so large as to be readily seen, and partly distributed in such small particles that it is only by chemical means that it can be obtained in quantities sufficient to be appreciated. In the flesh of some animals, as cod and other white-meated fish, and in chicken (young fowl), rabbit, and veal, there is little or no visible fat. In a very fat ox, on the other hand, one-fourth of the weight of meat may be visible fat, and, in the case of fat hogs, more than half the weight may be fat. No flesh is so lean as not to contain at least minute portions of fat. Very lean flesh, as codfish, may not have more than 0.3 per cent of fat, while fat pork may contain more than 90 per cent.

Fat is a valuable constituent of food. It is used in the body to form fatty tissues and is consumed as fuel, thus serving to maintain the animal temperature and to yield energy in the form of muscular and other power. It is the most concentrated form in which the fuel constituents of food are found. Its fuel value is two and one-fourth times that of protein or the carbohydrates. In other words, one pound of fat yields as much heat when burned as two and one-fourth pounds of carbohydrates, such as starch, sugar, etc. The fat of animal foods might be so applied that, together with animal protein, all the needs of the body could be met. The fuel constituents of vegetable foods are, however, better adapted to furnish a large part of the energy required by the body.

Diagram No. 3 illustrates the variations in the percentage of fats in the edible portions of different kinds and cuts of meats.

The smallest and largest percentages of water found in the edible portion of different kinds and cuts of meats.

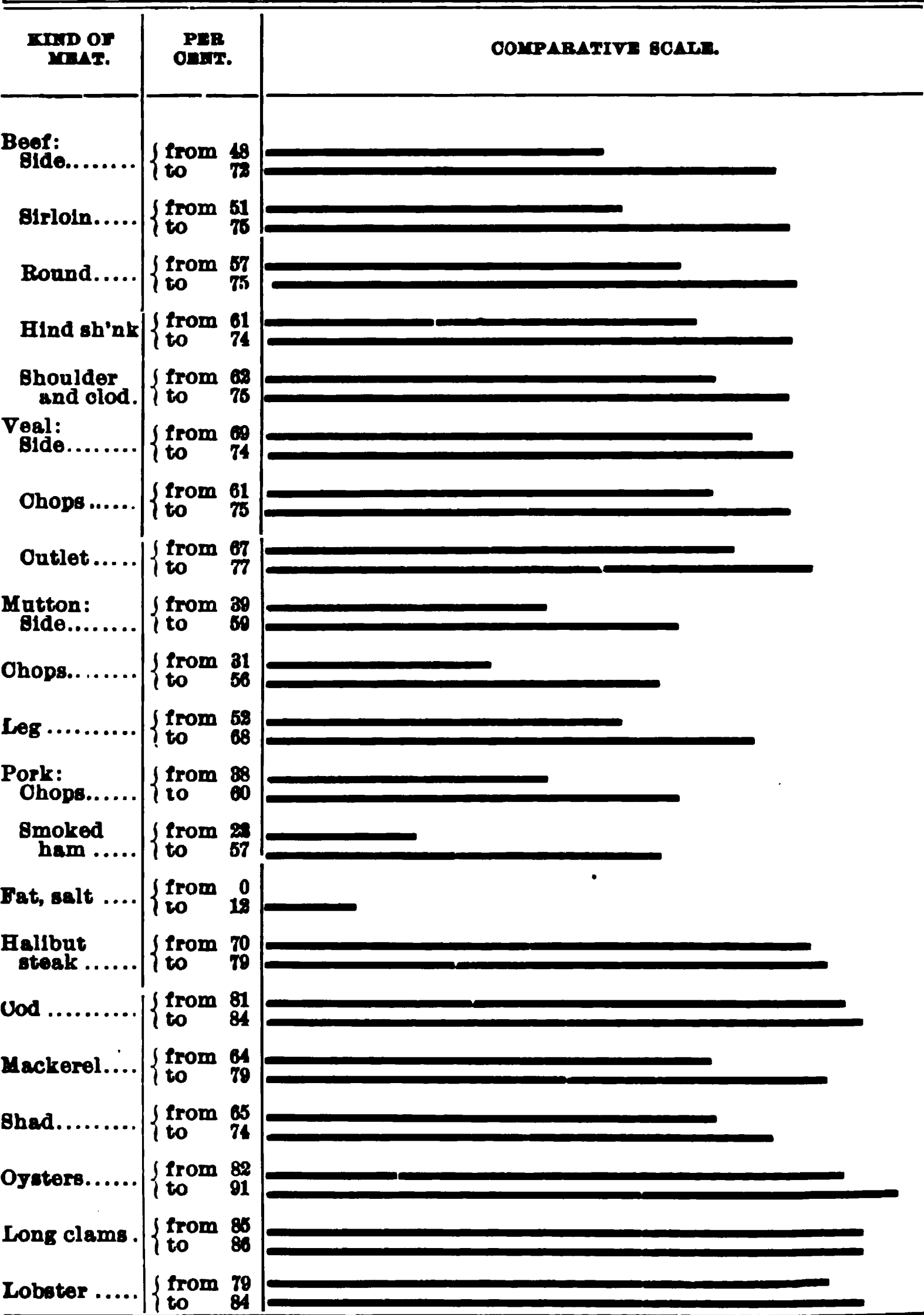


DIAGRAM NO. 2.

The smallest and largest percentages of fat in the edible portion of different kinds and cuts of meat.

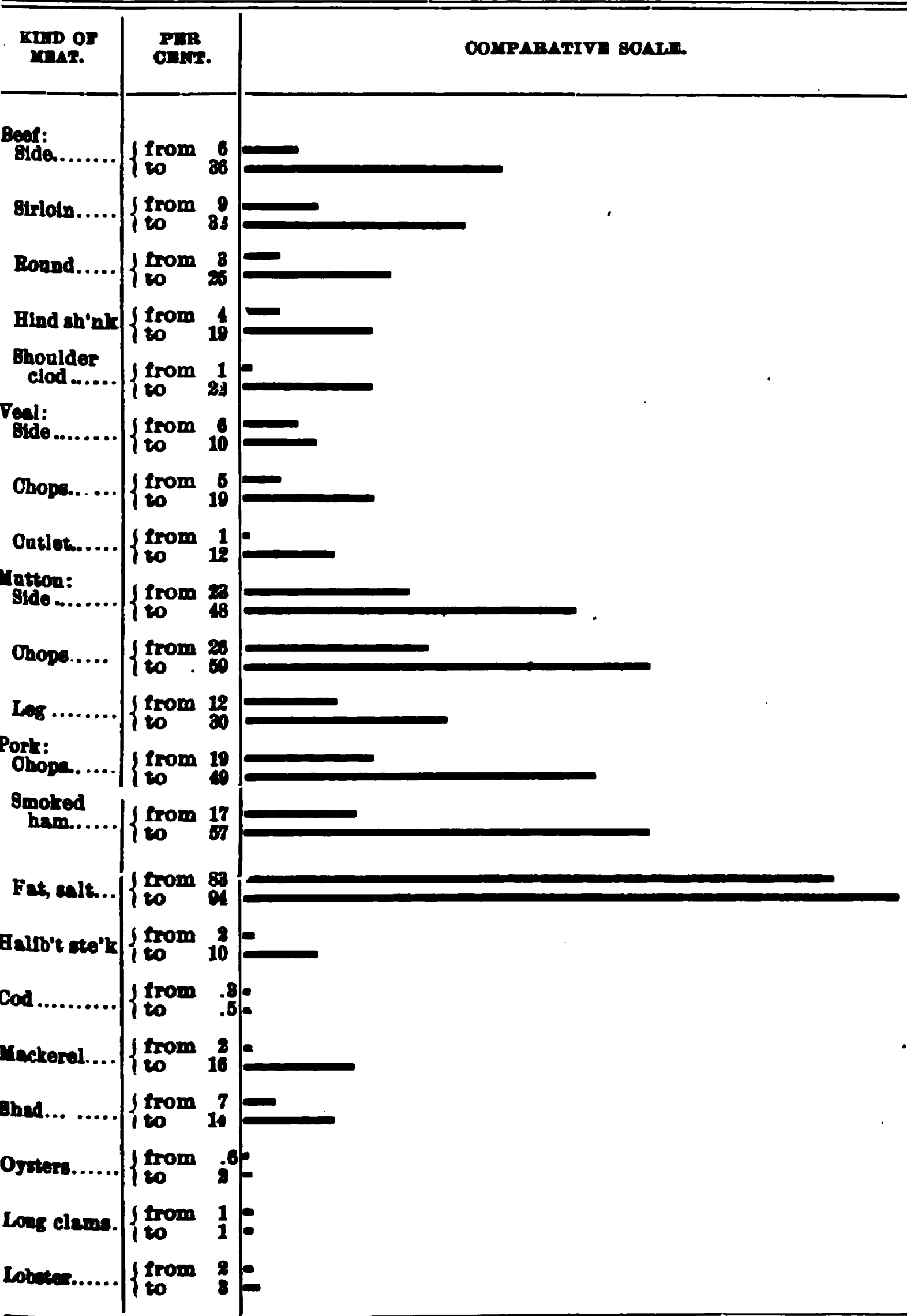


DIAGRAM NO. 3.

Nitrogenous constituents (protein)—There are a great many kinds of nitrogenous compounds in flesh, and an almost hopeless confusion exists in their classification and in the names assigned to the various classes by

different chemists. Chemists are quite generally agreed, however, in designating the total nitrogenous substance as protein. These compounds containing nitrogen may be arranged in the following three groups or classes:

PROTEIN:

Albuminoids, as albumen (white of eggs); casein (curd) of milk; myosin, the basis of muscle (lean meat); gluten of wheat, etc.

Gelatinoids, as collagen of tendons; ossein of bones; which yield gelatin or glue, etc.

Nitrogenous extractives.—Meats and fish contain very small quantities of so-called extractives. They include creatin and allied compounds, sometimes called meat bases, and are the chief ingredients of beef tea and meat extract.

The nitrogenous compounds of meats are made up chiefly of albuminoids and gelatinoids. The albuminoids are so called because they resemble albumen or white of an egg in their properties, and the gelatinoid substances are so named because of their similarity to gelatin. They are easily changed into gelatin by the action of hot water or steam, as in the manufacture of gelatin and glue from bones.

The value of meats as food is chiefly due to the nitrogenous compounds which they contain, and of these the most valuable are the albuminoids. This is due to the fact that they are very similar in composition to the nitrogenous compounds of the body, and are therefore easily digested and assimilated. Experiments with sheep, swine, dogs, and other animals seem to show that feeding rich, nitrogenous foods considerably increases the percentages of albuminoids in the flesh.

Very different views have been held at different times as to the value of gelatin as a food. At one time it was considered nearly as valuable as the albuminoids themselves; but later, from the investigations of the "French Gelatin Commission," it fell into disrepute and was held to have almost no food value. Later and better conducted experiments, however, have demonstrated that gelatin, when combined with albuminoids and extractives, has a very considerable nutritive value and serves to economize the albuminoids.

The last class, known as nitrogenous extractives, or meat bases, are so called because of the ease with which they may be dissolved out (extracted) by water. They are formed by the decomposition (cleavage) of albuminoids and probably gelatinoids. They consist largely of creatin and creatinin, substances which somewhat resemble thein and caffeine, the active principles of tea and coffee. They are of little value as food, but they give flavor to meats, and are therefore of great importance. They will be referred to again when we come to consider the flavors of meats, soups, and meat extracts.

The lean of meat, has, in round numbers, about 20 per cent of protein, or weight for weight, about five times as much as milk. The flesh of fowls, especially wild fowl, has on the average more protein than beef, and the flesh of fish has less.

While protein is the most important and valuable ingredient of food, lean flesh is, nevertheless, a one-sided diet, and to make a well-balanced ration for man the addition of foods containing carbon, such as fat, starches, sugar, etc., is necessary.

Diagram No. 4 illustrates the variation in protein in the edible portions of different kinds and cuts of meats.

Carbohydrates and ash.—Although carbohydrates occur in considerable quantities in other foods, flesh contains but a small amount—only a fraction of one per cent—and that chiefly in the form of glycogen, or muscle sugar. In some of the organs, notably the liver, there are considerable quantities of glycogen.

Meats also contain more or less of mineral matters (ash) which have value as food. The most important of these are the phosphates of potash, lime, and magnesia. These are used chiefly in the formation of bone.

TEXTURE TOUGHNESS OF MEATS.

Whether meats are tough or tender depends upon two things: the character of the walls of the muscle tubes and the character of the connective tissues which bind the tubes and muscles together. In young and well-nourished animals the tube walls are thin and delicate, and the connective tissue is small in amount. As the animals grow older or are made to work (and this is particularly true in the case of poorly nourished animals) the walls of the muscle tubes and the connective tissues become thick and hard. This is the reason why the flesh of young, well-fed animals is tender and easily masticated, while the flesh of old, hard-worked, or poorly fed animals is often so tough that prolonged boiling or roasting seems to have but little effect on it.

After slaughtering, meats undergo marked changes in texture. These changes can be grouped under three classes or stages. In the first stage, when the meat is just slaughtered, the flesh is soft, juicy, and quite tender. In the next stage the flesh stiffens and the meat becomes hard and tough. This condition is known as *rigor mortis* and continues until the third stage, when the first stages of decomposition set in. In hot climates the meat is commonly eaten in either the first or second stage. In cold climates it is seldom eaten before the second stage, and generally, in order to lessen the toughness, it is allowed to enter the third stage, when it becomes soft and tender, and acquires added flavor. The softening is due in part to the formation of lactic acid, which acts upon the connective tissue. The same effect may be produced, though more rapidly, by macerating the meat with weak vinegar. Meat is sometimes made tender by cutting the flesh into thin slices and pounding it across the cut ends until the fibers are broken.

The smallest and largest percentages of protein in the edible portion of different kinds and cuts of meat.

KIND OF MEAT.	PER CENT.	COMPARATIVE SCALE.
Beef:		
Side.	{ from 15 to 21	<div><div></div><div></div></div>
Sirloin.....	{ from 10 to 21	<div><div></div><div></div></div>
Round.....	{ from 18 to 22	<div><div></div><div></div></div>
Hind sh'nk	{ from 19 to 22	<div><div></div><div></div></div>
Shoulder clod.....	{ from 17 to 22	<div><div></div><div></div></div>
Veal:		
Side	{ from 19 to 20	<div><div></div><div></div></div>
Chops.....	{ from 18 to 21	<div><div></div><div></div></div>
Outlet	{ from 19 to 21	<div><div></div><div></div></div>
Mutton:		
Side.....	{ from 12 to 17	<div><div></div><div></div></div>
Chops.....	{ from 10 to 20	<div><div></div><div></div></div>
Leg	{ from 17 to 19	<div><div></div><div></div></div>
Pork:		
Chops ...	{ from 11 to 20	<div><div></div><div></div></div>
Smoked ham	{ from 14 to 21	<div><div></div><div></div></div>
Fat salt...	{ from 1 to 5	<div><div></div><div></div></div>
Halibut steaks.....	{ from 18 to 19	<div><div></div><div></div></div>
Cod	{ from 15 to 18	<div><div></div><div></div></div>
Mackerel....	{ from 18 to 19	<div><div></div><div></div></div>
Shad.....	{ from 18 to 20	<div><div></div><div></div></div>
Oysters	{ from 4 to 9	<div><div></div><div></div></div>
Long clams.	{ from 8 to 9	<div><div></div><div></div></div>
Lobster	{ from 12 to 18	<div><div></div><div></div></div>

DIAGRAM NO. 4.

FLAVOR OF MEATS.

The toughness or tenderness of meat, as has been stated above, is dependent upon the walls of the muscle tubes and the connective tissue. The flavor, however, depends largely upon the kinds and amounts of

“nitrogenous extractives” which the tubes contain. Pork and mutton are deficient in extractives, and what flavor they possess is due largely to the fats contained in them. The flesh of birds and of most game is very rich in extractives, which accounts for its high flavor. In general the flavor of any particular meat is largely modified by the condition of the animal when slaughtered, and by its food, age, breed, etc. We have seen that the flesh of young animals is more tender, but it is also true that it is not so highly flavored as that from more mature animals. In most cases, also, the flesh of males is more highly flavored than that of the females. There are two exceptions to this rule. The flesh of the goose is more highly flavored than that of the gander, and in the case of pork there is little difference between the flesh of the male and that of the female. Castration, as an illustration in the familiar example of the capon, makes the flesh more tender, fatter, and better flavored.

With the exception of fish, the flesh of animals which feed exclusively upon fish or flesh has a strong, disagreeable taste, and is eaten only by uncivilized people or those in great need. As regards ordinary meats, however, it is enough to say that the nitrogenous extractives, and hence the flavor, depends mainly upon the age of the animal and the character of its food.

Meat which is allowed to hang and ripen develops added flavors. In the first stages of decomposition compounds quite similar to the nitrogenous extractives are formed, and it is to these that the added flavors are due. Game is sometimes allowed to hang until the decomposition changes have gone so far as to be offensive to one whose taste is not educated to enjoy the flavor of “high” meat.

DIGESTIBILITY OF MEATS.

We must remember that, as in the case of other foods, the value of meats does not depend entirely upon the amount of nutrients which they contain, but to some extent upon the amount of these nutrients which the body can digest and use for its support. Digestion proper consists of the changes which the food undergoes in the digestive tract, where the digestible portion is prepared to be taken up by the blood and lymph. These changes are chemical processes, and we can determine quite readily by experiment how much of each nutrient will be digested, but this line of research is new and the methods are not yet perfectly matured.

Comparatively little attention has been given to the percentage of the different meats which are digested; but the facts so far obtained seem to indicate that flesh of all kinds, either raw or cooked, is quite completely digested by a healthy man. Rubner found that when given in quantities of not more than two pounds per day all but 3 per cent of dry matter of roasted beef was digested by a healthy man. From other experiments roasted flesh seems to be rather more *completely* digested than either raw, or boiled meat, but raw meat is more *easily* digested than cooked (boiled or roasted).

A far larger number of experiments and observations have been made upon the digestive processes which pertain to the stomach than upon complete digestion. This is partly due to the hygienic importance of stomach digestion (for a large part of the digestive disorders occur in the stomach)

and partly to the ease with which observations of stomach digestion can be made. Much is said about "ease of digestion," by which is usually meant the rapidity with which certain foods pass out of the stomach into the intestine, where the principal work of digestion actually takes place. Roast chicken and veal are tender, easily masticated, well flavored and appetizing, and so far as the stomach or gastric digestion is concerned, are easily and rapidly digested. This agrees with the practice of using the so-called "white meats" in diets for the sick room. The rapidity of gastric digestion of this class of foods is due to the tenderness of the muscular tissues and to the fact that this kind of meat contains almost no fat. Fat meats, as beef and mutton, are much less quickly passed out of the stomach, and gastric digestion in the case of fat pork is especially difficult. Although gastric digestion is important, it is by no means a measure of the digestibility of a food.

The question of the digestibility of food in the broad sense is a very complex one, and there is much room for investigation in this field of research in learning the quantities of nutrients which are digested from different kinds of meats, in studying the effects of cooking, in determining the influences of different substances and conditions upon digestion, and in the study of numerous other questions. Until these investigations and experiments shall have been made it will not be possible to affirm much more about the digestibility of meats than the simple but important statement that nearly all the protein and about 95 per cent of the fats are digested by the average person.

THE COOKING OF MEATS.

Uncivilized man differs from civilized man in no more striking way than in the preparation of food. The former takes his nourishment as it is offered by nature; the latter prepares his food before eating, and in ways which are more perfect the higher his culture.

Meat is rarely eaten raw by civilized people. For the most part it is either roasted, stewed, fried, or boiled. Among the chief objects of cooking are the loosening and softening of the tissues, which facilitates digestion by exposing them more fully to the action of the digestive juices. Another important object is to kill parasites, and thus render harmless organisms that might otherwise expose the eater to great risks. Minor, but by no means unimportant, objects are the coagulation of the albumen and blood so as to render the meat more acceptable to the sight, and the development and improvement of the natural flavor, which is often accomplished in part by the addition of conditions.

Flavoring materials and an agreeable appearance do not directly increase the thoroughness of digestion, but serve to stimulate the digestive organs to greater activity. As regards the actual amount digested, this stimulation is probably not of so great moment as is commonly supposed. Meat that has been extracted with water so as to be entirely tasteless has been found in actual experiment to be as quickly and completely digested as an equal weight of meat roasted in the usual way.

In general, it is probably true that cooking diminishes the ease of digestion of most meats. Cooking certainly cannot add to the amount of nutritive material in meat; and it may, as we shall see, remove considerable quantities of nutrients.

Boiling.—If it is desired to heat the meat enough to kill parasites or bacteria in the inner portions of the cut, the piece must be exposed to the action of heat for a long time. Ordinary methods of cooking are seldom sufficient. In a piece of meat weighing ten pounds the temperature of the interior, after boiling four hours, was only 190 degrees Fahrenheit. The inner temperature of meat when roasting has been observed to vary from 160 degrees to 200 degrees Fahrenheit, according to the size of the piece. In experiments upon the canning of meat it was found that when large and even small cans were kept for some time in a salt-water bath at a temperature considerably above the boiling point of water, the interior temperature of the meat rose only to 208 degrees in some cases and 165 degrees in others. Large cans of meat are more liable to have bad spots than smaller cans because the heat in them is not sufficient to destroy the bacteria or other organisms that cause the meat to decompose.

If meat is placed in cold water, part of the organic salts, the soluble albumen, and the extractive or flavoring matters will be dissolved out. At the same time small portions of lactic acid are formed, which act upon the meat and change some of the insoluble matters into materials which may also be dissolved out. The extent of this action and the quantity of materials which actually go into the solution depend upon three things: the amount of surface exposed to the water, the temperature of the water, and the length of the time of the exposure. The smaller the pieces, the longer the time, or the hotter the water, the richer will be the broth and the poorer the meat. If the water is heated gradually, more and more of the soluble materials are dissolved. At a temperature of about 134 degrees Fahrenheit the soluble albumen will begin to coagulate, and at 160 degrees Fahrenheit the dissolved albumen will rise as a brownish scum to the top and the liquid will become clear. Upon heating still higher, the connective tissues begin to be changed into gelatin and are partly dissolved out, while the insoluble albuminoids are coagulated. The longer the action of the hot water continues, the tougher and more tasteless the meat becomes, but the better the broth. Treated in this way flesh may lose over 40 per cent by weight. The loss is principally water, but from 5 to 8 per cent may be made up of the soluble albumen, gelatin, mineral matters, organic acids, muscle sugar, and flavoring materials. Part of the melted fat also goes into the broth.

It would be a great mistake to assume that the nearly tasteless mass of fibers which is left undissolved by the water has no nutritive value. This tasteless material has been found to be as easily and completely digested as the same weight of ordinary roast. It contains nearly all the protein of the meat, and, if it is properly combined with vegetables, salt and flavoring materials, makes an agreeable as well as nutritive food.

If a piece of meat is plunged into boiling water or very hot fat, the albumen on the entire surface of the meat is quickly coagulated, and the enveloping crust thus formed resists the dissolving action of water and prevents the escape of the juices and flavoring matters. Thus cooked, the meat retains most of its flavoring matters and has the desired meaty taste. The resulting broth is correspondingly poor.

The foregoing statements will be of much help in the rational cooking of meats in water. The treatment depends largely upon what it is desired

to do. It is impossible to make a rich broth and have a juicy, highly flavored piece of boiled meat at the same time. If the meat alone is to be used, the cooking in water should be as follows: Plunge the cut at once into a generous supply of boiling water and keep the water at the boiling point, or as near boiling as possible, for ten minutes, in order to coagulate the albumen and seal the pores of the meat; the coating thus formed will prevent the solvent action of the water and the escape of the soluble albumen and juices from the inner portions of the meat. But if the action of the boiling water should be continued, the whole interior of the meat would, in time, be brought near the temperature of boiling water, and all the albumen would be coagulated and rendered hard. Instead of keeping the water at the boiling point (212° F.), therefore, the temperature should be allowed to fall to about 180° F., when the meat could be thoroughly cooked without becoming hard. A longer time will be required for cooking meat in this way, but the albumen will not be firmly coagulated, and the flesh will be tender and juicy instead of tough and dry, as will be the case when the water is kept boiling, or nearly boiling, during the entire time of cooking.

In boiling sections of delicate fish, as salmon, cod, or halibut, the plunging into boiling water is objectionable because the motion of the boiling water tends to break the fish into small pieces. Fish should be first put in water that is on the point of boiling. The water should be kept at this temperature for a few minutes and then allowed to fall to 180°, as in the case of meats.

Stewing.—If both the broth and the meat are to be used, the process of cooking should be quite different from that outlined for boiling meat. Stewing is in this country a much under-valued method of cooking. This is probably due partly to the fact that stewing is generally very improperly done, and partly to the general aversion which Americans, consciously or unconsciously, have to “made dishes” of any kind. This aversion probably has its origin in a false notion which spurns economy or any attempt at economy in diet.

In stewing, the meat should be cut into small pieces, so as to present relatively as large a surface as possible, and, instead of being quickly plunged into hot water, should be put into cold water in order that much of the juices and flavoring materials may be dissolved. The temperature should then be slowly raised until it reaches about 180 degrees Fahrenheit, where it should be kept for some hours. Treated in this way, the broth will be rich and the meat still tender and juicy.

If the water is made much hotter than 180 degrees, Fahrenheit, the meat will be dry and fibrous. It is true that if a high temperature is maintained long enough the connective tissues will be changed to gelatin and partly dissolved away, and the meat will apparently be so tender that if touched with a fork it will fall to pieces. It will be discovered, however, that no matter how easily the fibers come apart, they offer considerable resistance to mastication. The albumen and fibrin have become thoroughly coagulated, and while the fibers have separated from each other the prolonged boiling has only made them drier and firmer.

Broths, soups, meat extracts.—The quantities of the ingredients in a meat broth may be illustrated by a German experiment. One pound of

beef and seven ounces of veal bones gave about a pint of strong broth or soup, which contained, by weight: Water, 95.2 per cent; protein, 1.2 per cent; fat, 1.5 per cent; extractives, 1.8 per cent; mineral matters, 0.3 per cent.

Very palatable broths can be made by using more water and adding savory herbs. Broths thus made have, of course, a greater amount of water, frequently as much as 98 per cent, or even more, and the nutrients are correspondingly reduced in amount. It would appear from the analysis given above that the amount of solids in broths is generally small. Consequently their strong taste and stimulating effect upon the nervous system must be ascribed to the meat bases (flavoring matters) and to the salts of potash which they contain. Besides meat bases, soups contain more or less gelatin, varying directly with the quantity of bones used in the preparation.

The term meat extract is commonly applied to a large number of preparations of very different character. They may be conveniently divided into three classes: (1) true meat extracts; (2) meat juice obtained by pressure and preserved, compounds which contain dried pulverized meat, and similar preparations; and (3) albumose or peptose preparations, commonly called predigested foods.

The true meat extract, if pure, contains little else besides the flavoring matters of the meat from which it is prepared, together with such mineral salts as may be dissolved out. It should contain no gelatin or fat, and can not, from the way in which it is made, contain any albumen. It is, therefore, not a food at all, but a stimulant, and should be classed with tea, coffee, and other allied substances. It should never be administered to the sick except as directed by competent medical advice. Its strong, meaty taste is deceptive, and the person depending upon it alone for food would certainly die of starvation. Such meat extracts are often found useful in the kitchen for flavoring soups, sauces, etc. Broth and beef tea as prepared ordinarily in the household contain more or less protein, gelatin, and fat, and therefore are foods as well as stimulants. The proportion of water in such compounds is always very large.

The preserved meat juice and similar preparations contain more or less protein, and therefore have some value as food.

The third class of preparations is comparatively new. The better ones are really what they claim to be—predigested foods. They contain the soluble albumoses (peptoses), etc., which are obtained from meat by artificial digestion. The use of such preparations should be regulated by competent medical advice.

Roasting and broiling.—The principal difference between roasting and boiling is in the medium in which the meat is cooked. In boiling, the flesh to be cooked is surrounded by boiling water; in roasting, by hot air, although in roasting proper much of the heat comes to the joint as “radiant” heat. In both cases, if properly conducted, the fibers of the meats are cooked in their own juices.

When the meat alone is to be eaten, either roasting, broiling, or frying in deep fat is, when properly done, a more rational method than boiling, for the juices are very largely saved. The shrinkage in a roast of meat during cooking is chiefly due to a loss of water. At the same time small

amounts of carbon and nitrogen are driven off and a little acid is produced which dissolves some of the constituents of the meat. The fat undergoes a partial decomposition into fatty acids and glycerin, and a little of it is volatilized.

It is interesting and at the same time important to remember that the smaller the cut to be roasted the hotter should be the fire. An intensely hot fire coagulates the exterior and prevents the drying up of the meat juices. This method would not, however, be applicable to large cuts, because meats are poor conductors of heat, and a large piece of meat exposed to this intense heat would become burned and changed to a charcoal on the exterior long before the heat could penetrate to the interior. Hence the rule: The smaller the cut to be roasted, the higher the temperature to which it should be exposed.

The broiling of a steak or a chop is done on exactly this principle. An intense heat should be applied to thoroughly coagulate the albumen and stop the pores, and thus prevent the escape of the juices. A steak exposed to an intense heat for ten minutes is thoroughly cooked, and has yet that rare, juicy appearance which is so desirable.

APPENDIX.

CUTS OF MEAT.

The method of dividing up the carcasses of slaughtered animals varies considerably in different localities. In order that there may be no confusion on this account the character of the cuts of beef, veal, pork, and mutton referred to in the table below are shown in the following diagrams:

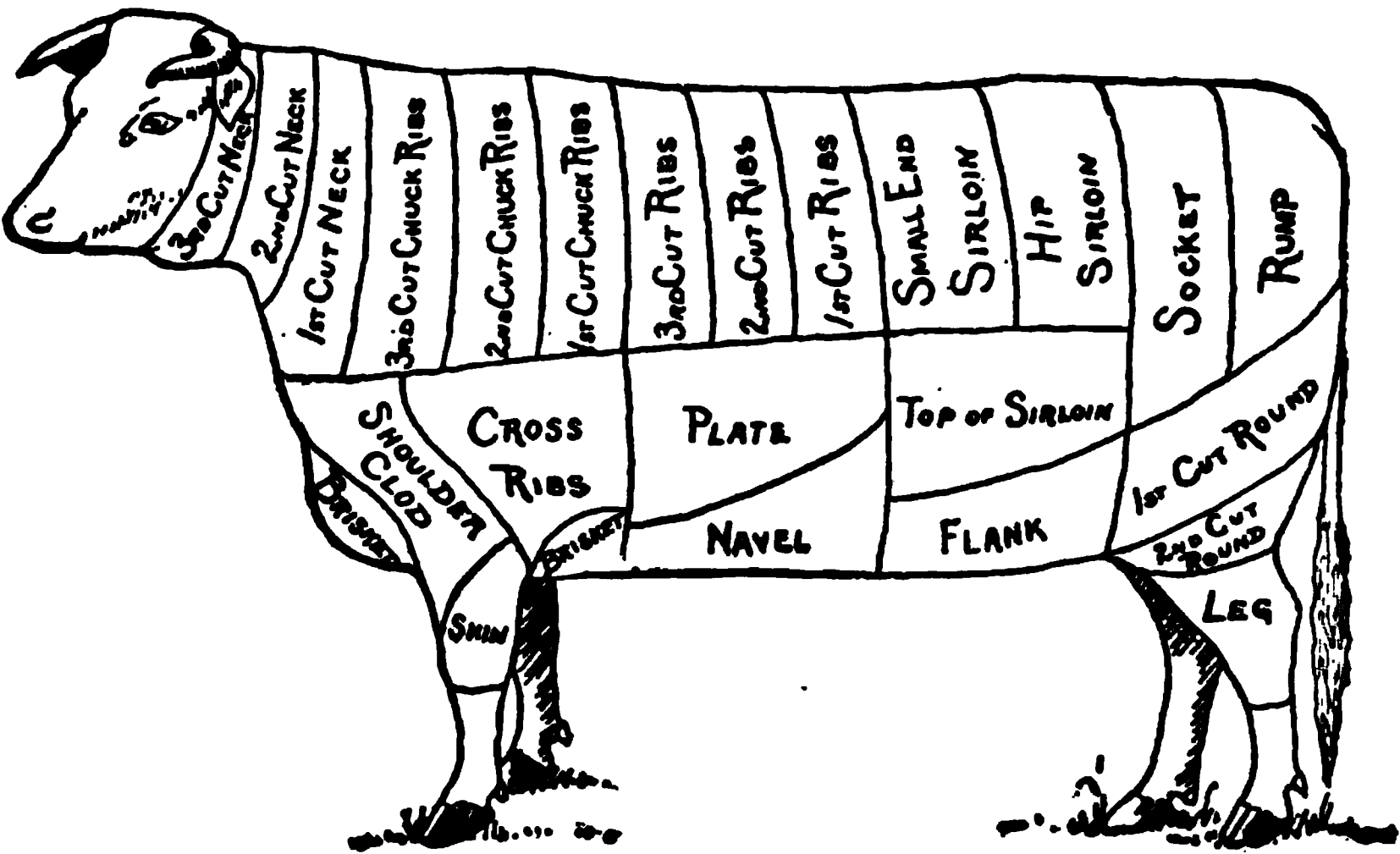


FIG. 1.—Diagram of cuts of beef.
Woods, Farmers' Bulletin 34, U. S. Department of Agriculture.

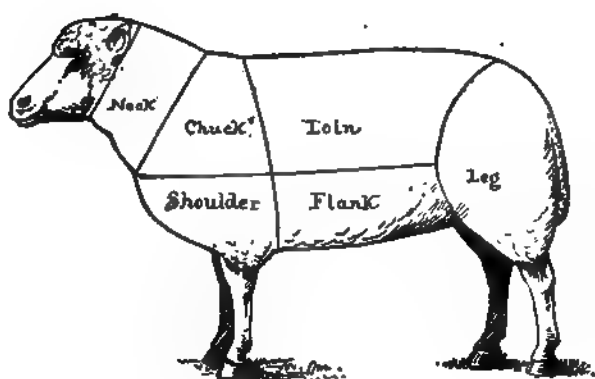


FIG. 2.—Diagram of cuts of veal.

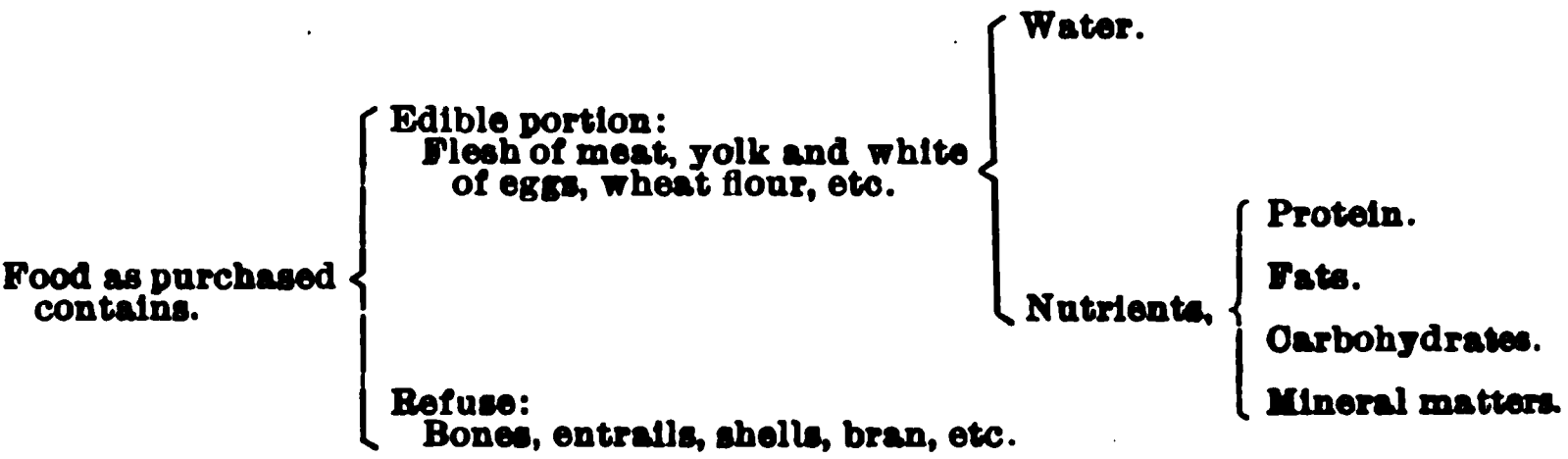
FIG. 3.—Diagram of cuts of pork.

FIG. 4.—Diagram of cuts of mutton.
Woods, Farmers' Bulletin 24, U. S. Department of Agriculture.

COMPOSITION AND FUEL VALUE OF MEATS.

Within recent years analyses of a large number of samples of meat have been made in this country. In the table given below the average results of these analyses are given. Brief explanatory notes regarding the nutritive ingredients of food and their uses in the body are also given, which may serve to make the table more intelligible.

NUTRITIVE INGREDIENTS OF FOOD AND THEIR USES IN THE BODY.



USES OF NUTRIENTS.

Protein.....	Forms tissue (muscle, tendon, fat).	All serve as fuel and yield energy in form of heat and muscular strength.
White (albumen) of eggs, curd (casein) of milk, lean meat, gluten of wheat, etc.		
Fats.....	Form fatty tissue.	
Fat of meat, butter, olive oil, oils of corn and wheat, etc.		
Carbohydrates	Transformed into fat.	
Sugar, starch, etc.		
Mineral matters (ash) ..	Aid in forming bone, assist in digestion, etc.	
Phosphates of lime, potash, soda, etc.		

The fuel value of food.—Heat and muscular power are forms of force or energy. The energy is developed as the food is consumed in the body. The unit commonly used in this measurement is the calorie, the amount of heat which would raise the temperature of a pound of water 4 degrees Fahrenheit.

The following general estimate has been made for the average amount of potential energy in one pound of each of the classes of nutrients:

	Calories.
In 1 pound of protein.....	1,860
In 1 pound of fats.....	4,220
In 1 pound of carbohydrates.....	1,860

In other words, when we compare the nutrients in respect to their fuel values, their capacities for yielding heat and mechanical power, a pound of protein of lean meat or albumen of egg is just about equivalent to a pound of sugar or starch, and a little over two pounds of either would be required to equal a pound of the fat of meat or butter or the body fat.

Table showing the chemical composition and fuel value per pound of meats.

KIND AND CUT OF MEAT.	Refuse.	Water.	NUTRIENTS.					Fuel value per pound.
			Water-free substance	Protein.	Fat.	Carbohy- drates.	Ash.	
BEEF.	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Calories.</i>
Brisket:								
Edible portion.....		47.4	52.6	14.6	87.2		.8	1,840
As purchased.....	14.3	40.6	45.1	12.5	81.9		.7	1,580
Chuck, with shoulder:								
Edible portion.....		67.8	32.2	19	12.3		.9	870
As purchased.....	17	56.3	26.7	15.7	10.2		.8	720
Chuck ribs:								
Edible portion.....		57.3	42.7	17.4	24.4		.9	1,355
As purchased.....	18.8	49.3	26.9	15	21.1		.8	1,170
Flank:								
Edible portion.....		59.3	40.7	17.6	22.2		.9	1,280
As purchased.....	6.6	55.5	37.9	16.5	20.6		.8	1,175
Loin:								
Edible portion.....		60.5	39.5	18.3	20.2		1	1,190
As purchased.....	13	52.6	34.4	15.9	17.6		.9	1,040
Neck:								
Edible portion.....		63.4	36.6	19.2	16.5		.9	1,055
As purchased.....	27.6	45.9	26.5	13.9	11.9		.7	780
Plate:								
Edible portion.....		53.7	47.3	15.4	31.1		.8	1,600
As purchased.....	14.7	44.9	40.4	13.1	26.6		.7	1,335
Ribs:								
Edible portion.....		55.4	44.6	16.9	26.8		.9	1,445
As purchased.....	20.8	43.8	35.4	13.4	21.3		.7	1,150
Ribs, cross:								
Edible portion.....		43.9	56.1	13.7	41.6		.8	2,010
As purchased.....	12.2	38.6	49.2	12	35.5		.7	1,765
Round:								
Edible portion.....		65.8	34.2	19.7	13.5		1	935
As purchased.....	7.7	60.7	31.6	18.1	12.6		.9	870
Round, second cut:								
Edible portion.....		69.5	30.5	20.6	8.6		1.3	745
As purchased.....	32.1	47.2	20.7	14	5.8		.9	505
Rump:								
Edible portion.....		56.7	43.3	16.8	25.6		.9	1,305
As purchased.....	21.4	44.5	34.1	13.2	20.2		.7	1,095
Shank, fore:								
Edible portion.....		67.9	32.1	19.6	11.6		.9	855
As purchased.....	26.9	42.9	20.2	12.3	7.3		.6	535
Shank, hind:								
Edible portion.....		67.8	32.2	19.8	11.5		.9	855
As purchased.....	53.9	31.3	14.8	9.1	5.3		.4	395
Shoulder and clod:*								
Edible portion.....		68.3	31.7	19.3	11.3		1.1	835
As purchased.....	16.4	56.8	26.8	16.1	9.8		.9	715
Fore quarter:								
Edible portion.....		61.4	38.6	17.5	20.2		.9	1,180
As purchased.....	19.4	49.5	31.1	14.1	16.3		.7	950
Hind quarter:								
Edible portion.....		61	39	18	20.1		.9	1,185
As purchased.....	15.8	51.3	32.9	15.2	17		.7	1,000
Side:								
Edible portion.....		60.6	39.4	17.7	20.8		.9	1,205
As purchased.....	18.3	49.7	32	14.5	16.8		.7	980
Liver, as purchased.....		69.8	30.2	21.6	5.4	1.8	1.4	665
Cooked, corned and canned, as purchased.....		53.1	46.9	26.5	14		4.4	1,120
Corned brisket:								
Edible portion.....		50.9	49.1	13.7	24.7		5.7	1,300
As purchased.....	21.4	40	28.6	14.7	19.4		4.5	1,090
Corned flank:								
Edible portion.....		49.9	50.1	14.3	23		2.9	1,660
As purchased.....	12.1	43.7	44.2	12.4	29.2		2.6	1,465
Corned plate:								
Edible portion.....		40.1	59.9	13.3	41.9		4.7	2,015
As purchased.....	14.5	34.3	51.2	11.4	35.8		4	1,720

*The clod itself has no bone, i. e., refuse.

Table showing the chemical composition and fuel value per pound of meat—Continued.

KIND AND CUT OF MEAT.	Refuse.	Water.	NUTRIENTS.					Fuel value per pound.
			Water-free substance.	Protein.	Fat.	Carbohydrates.	Ash.	
BEEF—continued.	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Calories</i>
Corned rump:								
Edible portion.....		58.1	41.9	15.8	23.3		3.3	1,370
As purchased.....	6	54.5	39.5	14.4	22		8.1	1,195
Dried and smoked, as purchased.....		50.8	49.2	31.8	6.8	.6	10	845
Tongue:								
Canned, whole, as purchased.....		51.3	78.7	21.5	23.2		4	1,380
Canned, ground, as purchased.....		49.9	50.1	21	25.1		4	1,450
Pickled, as purchased.....		62.3	37.7	12.5	20.5		4.7	1,100
VEAL.								
Breast:								
Edible portion.....		66.4	33.6	18.8	18.8		1	930
As purchased.....	20.6	52.7	26.7	14.9	11		.8	740
Chuck:								
Edible portion.....		73.8	26.7	19.2	6.5		1	620
As purchased.....	18.9	59.5	21.6	15.6	5.2		.8	510
Flank, as purchased.....		68.9	31.1	19.7	10.4		1	805
Leg, whole:								
Edible portion.....		70.4	29.5	20.1	8.4		1.1	730
As purchased.....	15.6	59.4	25	16.9	7.2		.9	620
Leg, cutlets:								
Edible portion.....		78.3	31.7	20.8	9.9		1	805
As purchased.....	4	65.6	30.4	20	9.5		.9	775
Loin:								
Edible portion.....		69.2	30.8	19.4	10.4		1	800
As purchased.....	17.3	57.2	25.5	16	8.6		.9	680
Neck:								
Edible portion.....		72.6	27.4	19.5	6.9		1	655
As purchased.....	31.5	49.9	18.6	13.2	4.6		.7	440
Rib:								
Edible portion.....		72.5	27.5	20.2	6.2		1.1	635
As purchased.....	26.9	53	20.1	14.7	4.6		.8	470
Rump:								
Edible portion.....		62.6	37.4	20.1	16.2		1.1	1,055
As purchased.....	30.2	43.7	28.1	14	11.3		.8	735
Shank, fore:								
Edible portion.....		74	26	19.8	5.2		1	580
As purchased.....	40.4	44.1	15.5	11.8	3.1		.6	350
Shank, hind:								
Edible portion.....		74.5	25.5	19.9	4.6		1	585
As purchased.....	62.7	27.8	9.5	7.4	1.7		.4	210
Fore quarter:								
Edible portion.....		71.7	28.3	19.4	8		.9	700
As purchased.....	24.5	54.2	21.3	14.6	6		.7	525
Hind quarter:								
Edible portion.....		70.9	29.1	19.8	8.3		1	720
As purchased.....	20.7	55.2	23.1	15.7	6.6		.8	570
Side:								
Edible portion.....		71.3	28.7	19.6	8.1		1	705
As purchased.....	22.6	55.2	22.2	15.1	6.3		.8	545
Liver, as purchased.....		73.1	26.9	20.4	5.3		1.2	605
LAMB.								
Breast:								
Edible portion.....		56.2	43.8	19.2	23.6		1	1,355
As purchased.....	19.1	45.5	35.4	15.5	19.1		.8	1,065
Leg, hind:								
Edible portion.....		63.9	36.1	18.5	16.5		1.1	1,040
As purchased.....	17.4	52.9	29.7	15.2	13.6		.9	855
Loin:								
Edible portion.....		53.1	46.9	17.6	28.3		1	1,520
As purchased.....	14.8	45.3	39.9	15	24.1		.8	1,285

Table showing the chemical composition and fuel value per pound of meats—Continued.

KIND AND CUT OF MEAT.	Refuse.	Water.	NUTRIENTS.					Fuel value per pound.
			Water-free substance	Protein.	Fat.	Carbohy- drates.	Ash.	
LAMB—continued.								
Neck:	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Calories
Edible portion.....		56.7	43.3	17.5	24.8		1	1,375
As purchased.....	17.7	46.7	35.6	14.4	20.4		.8	1,130
Shoulder:								
Edible portion.....		51.8	48.2	17.5	29.7		1	1,580
As purchased.....	20.8	41.3	38.4	14	23.6		.8	1,255
MUTTON.								
Chuck:								
Edible portion.....		50.9	49.1	14.6	33.6		.9	1,690
As purchased.....	21.3	39.9	38.8	11.5	26.7		.6	1,340
Flank, as purchased...		45.8	54.2	14.8	38.7		.7	1,910
Leg, hind:								
Edible portion.....		63.8	37.2	18.2	18		1	1,100
As purchased.....	18	51.4	30.6	14.9	14.9		.8	905
Loin:								
Edible portion.....		50.1	49.9	15.9	33.2		.8	1,695
As purchased.....	15.3	42.2	42.5	13.2	28.6		.7	1,450
Neck:								
Edible portion.....		58.2	41.8	16.3	24.5		1	1,335
As purchased.....	23.4	41.6	30	11.7	17.6		.7	960
Shoulder:								
Edible portion.....		61.9	38.1	17.3	19.9		.9	1,160
As purchased.....	21.7	48.5	29.8	13.5	15.6		.7	910
Fore quarter:								
Edible portion.....		51.7	48.3	15	32.4		.9	1,645
As purchased.....	21.1	40.6	38.3	11.9	25.7		.7	1,305
Hind quarter:								
Edible portion.....		54.8	45.2	16.2	28.2		.8	1,490
As purchased.....	16.7	45.6	37.7	13.5	23.5		.7	1,245
Side, without tallow:								
Edible portion.....		53.1	46.9	15.4	30.7		.7	1,580
As purchased.....	19.2	42.9	37.9	12.6	24.7		.7	1,275
PORK.								
Chuck and shoulder:								
Edible portion.....		51.1	48.9	16.9	31.1		.9	1,630
As purchased.....	18.1	41.8	40.1	13.8	25.5		.8	1,335
Flank:								
Edible portion.....		59	41	17.8	23.2		1	1,265
As purchased *.....	71.3	17	11.8	5.1	6.4		.3	365
Loin:								
Edible portion.....		52	48	16.8	30.3		.9	1,590
As purchased.....	15.8	43.8	40.4	14.1	25.6		.7	1,340
Leg, hind:								
Edible portion.....		62.8	37.2	18.5	17.7		1	1,090
As purchased.....	42.4	35.7	21.9	10.7	10.6		.6	645
Ham, smoked:								
Edible portion.....		40.7	59.3	15.5	39.1		4.7	1,940
As purchased.....	14.4	34.9	50.7	13.3	33.4		4	1,355
Ham, boneless, as pur- chased.....		50.1	49.9	15.4	28.5		6	1,490
Shoulder, fresh:								
Edible portion.....		57.5	42.5	15.6	26.1		.8	1,390
As purchased.....	46.6	30.4	23	8.3	14.3		.4	760
Shoulder, smoked:								
Edible portion.....		46.8	53.2	15.5	33.3		4.4	1,695
As purchased.....	15.4	39.8	44.8	13.1	28.1		3.6	1,430
Salt, clear fat, as pur- chased.....		7.3	92.7	1.8	87.2		3.7	3,715
Salt, lean ends:								
Edible portion.....		19.9	80.1	7.3	67.1		5.7	2,965
As purchased.....	11.3	17.6	71.2	6.5	59.6		5.1	2,635
Bacon, smoked:								
Edible portion.....		18.2	81.8	10	67.2		4.6	3,620
As purchased.....	8	16.8	75.2	9.2	61.8		4.2	2,781

*Refuse includes fat trimmings †Refuse case

• Table showing the chemical composition and fuel value per pound of meats—Continued.

KIND AND CUT OF MEAT.	Refuse.	Water.	NUTRIENTS.					Fuel value per pound.
			Water-free substance	Protein.	Fat.	Carbohydrates.	Ash.	
PORK—continued.	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Calories.</i>
Feet:								
Edible portion.....	.....	68.2	31.8	16.1	14.8	.....	.9	925
As purchased.....	35.5	44.6	19.9	10	9.3	.....	.6	580
Ham, deviled, canned, as purchased.....	.....	45.8	54.7	18.9	32.9	.....	2.9	1,740
Side:								
Edible portion.....	.....	29.4	70.6	8.5	61.7	.....	.4	2,760
As purchased.....	11.2	26.1	62.7	7.5	54.8	.....	.4	2,455
SAUSAGE.								
Bologna:								
Edible portion.....	.....	59.5	40.5	18.6	18.2	.1	3.6	1,115
As purchased.....	3.3	55.2	41.5	18	19.7	.....	3.8	1,165
Frankfurt, as purchased.....	.....	55.5	44.5	21.7	18.8	.4	3.6	1,205
Pork, as purchased.....	.....	38.7	61.3	12.8	45.4	8	2.3	2,155
Tongue, as purchased.....	.....	46.4	53.6	17.8	33.1	.....	3.2	1,720
SOUPS, CANNED.								
Bouillon, as purchased.....	.....	96.5	3.5	2	.1	.2	1.2	45
Chicken, as purchased.....	.....	93.8	6.2	3.6	.1	1.5	1	100
Consommé, as purchased.....	.....	96	4	2.5	.....	.4	1.1	55
Mock turtle, as purchased.....	.....	89.8	10.2	5.2	.9	2.8	1.3	185
Ox tail, as purchased.....	.....	88.8	11.2	4	1.3	4.3	1.6	210
Tomato, as purchased.....	.....	90	10	1.8	1.1	5.6	1.5	185
POULTRY.								
Chicken:								
Edible portion.....	.....	74.2	25.8	23.8	1.8	.....	1.2	500
As purchased.....	34.8	48.5	16.7	14.8	1.1	.....	.8	325
Fowls:								
Edible portion.....	.....	66.3	33.7	18.2	14.4	.....	1.1	945
As purchased.....	20	46.5	23.5	12.5	10.2	.....	.8	665
Goose:								
Edible portion.....	.....	42.3	57.7	13	43.9	.....	.8	2,005
As purchased.....	22.2	34.1	44.7	10.3	33.8	.....	.6	1,620
Turkey:								
Edible portion.....	.....	55.5	44.5	20.6	22.9	.....	1	1,250
As purchased.....	22.7	42.4	34.9	15.7	18.4	.....	.8	1,070
Chicken, canned, as purchased.....	.....	46.9	53.1	20.5	30	.....	2.6	1,645
Quail, canned, as purchased.....	.....	66.9	33.1	21.8	8	1.7	1.6	775
Turkey, canned, as purchased.....	.....	47.4	52.6	20.7	29.2	.....	2.7	1,400
FISH, FRESH.								
Alewife, whole:								
Edible portion.....	.....	74.4	25.6	19.2	4.9	.....	1.5	565
As purchased.....	49.5	37.6	12.9	9.7	2.4	.....	.8	265
Bass, black, whole:								
Edible portion.....	.....	76.7	23.3	20.4	1.7	.....	1.2	450
As purchased.....	54.8	34.6	10.6	9.3	.8	.....	.5	205
Bass, sea, whole:								
Edible portion.....	.....	79.3	20.7	18.8	.5	.....	1.4	370
As purchased.....	56.1	34.8	9.1	8.3	.2	.....	.5	160
Bass, striped, entrails removed:								
Edible portion.....	.....	77.7	22.3	18.3	2.8	.....	1.2	465
As purchased.....	51.2	37.4	11.4	8.7	2.2	.....	.5	255
Bluefish, entrails removed:								
Edible portion.....	.....	78.5	21.5	19	1.2	.....	1.3	405
As purchased.....	48.6	40.3	11.1	9.8	.6	.....	.7	205

Table showing the chemical composition and fuel value per pound of meats—Continued.

KIND AND CUT OF MEAT.	Refuse.	Water.	NUTRIENTS.					Fuel value per pound.
			Water-free substance.	Protein.	Fat.	Carbohy- drates.	Ash.	
FISH—continued.								
Osco:			.					
Edible portion.....		76.1	23.9	19.1	3.5		1.3	505
As purchased.....	42.7	43.6	13.7	11	2		.7	290
Cod, dried:								
Edible portion.....		82.6	17.4	15.8	.4		1.2	310
As purchased.....	29.9	58.5	11.6	10.6	.2		.8	205
Cod, steaks, as pur- chased.		82.5	17.5	16.3	.3		.9	315
Flounder, entrails re- moved:								
Edible portion.....		84.2	15.8	13.9	.6		1.3	285
As purchased.....	57	35.8	7.2	6.3	.8		.6	120
Haddock, entrails re- moved:								
Edible portion.....		81.7	18.3	16.8	.3		1.2	325
As purchased.....	51	40	.9	8.2	.2		.6	160
Halibut steak:								
Edible portion.....		75.4	24.6	18.3	5.2		1.1	560
As purchased.....	17.7	61.9	20.4	15.1	4.4		.9	465
Mackerel, entrails re- moved:								
Edible portion.....		73.4	26.6	18.2	7.1		1.3	640
As purchased.....	40.7	43.7	15.6	11.4	3.5		.7	360
Muskelonge, whole:								
Edible portion.....		76.3	23.7	19.6	2.5		1.6	470
As purchased.....	49.2	38.7	13.1	10	1.3		.8	240
Perch, white, whole:								
Edible portion.....		75.7	24.3	19.1	4		1.2	525
As purchased.....	62.5	28.4	9.1	7.2	1.5		.4	195
Perch, yellow, dressed:								
Edible portion.....		79.3	20.7	18.7	.8		1.2	385
As purchased.....	35.1	50.7	14.2	12.6	.7		.9	265
Pickarel, entrails re- moved:								
Edible portion.....		79.8	20.2	18.6	.5		1.1	365
As purchased.....	42.7	45.7	11.6	10.7	.3		.6	210
Salmon, entrails re- moved:								
Edible portion.....		71.4	23.6	19.9	7.4		1.3	680
As purchased.....	23.8	51.2	25	14.6	9.5		.9	675
Salmon, California, sections:								
Edible portion.....		63.6	36.4	17.5	17.9		1	1,080
As purchased.....	10.3	57.9	31.8	16.1	14.8		.9	925
Salmon trout, whole:								
Edible portion.....		69.1	30.9	18.2	11.4		1.3	820
As purchased.....	56.3	30	13.7	7.7	5.4		.6	985
Shad, whole:								
Edible portion.....		70.6	29.4	18.6	9.5		1.3	745
As purchased.....	50.1	35.2	14.7	9.2	4.8		.7	375
Sturgeon, sections;								
Edible portion.....		78.7	21.3	18	1.9		1.4	415
As purchased.....	14.4	67.4	18.2	15.4	1.6		1.2	355
Trout, brook, whole:								
Edible portion.....		77.8	22.2	18.9	2.1		1.2	440
As purchased.....	48.1	40.4	11.5	9.8	1.1		.6	230
Weak fish, whole:								
Edible portion.....		79	21	17.4	2.4		1.2	425
As purchased.....	51.9	38	10.1	8.4	1.1		.6	200
FISH, PRESERVED.								
Cod, salt:								
Edible portion.....		53.6	46.4	21.4	.4		24.6	410
As purchased.....	24.9	40.3	34.8	16	.4		18.4	315
Cod, salt, boneless, as purchased.....		54.4	45.6	22.2	.3		23.1	425

Table showing the chemical composition and fuel value per pound of meats—Continued.

KIND AND CUT OF MEAT.	Refuse.	Water.	NUTRIENTS.					Fuel value per pound.
			Water-free substance.	Protein.	Fat.	Carbohy- drates.	Ash.	
FISH, PRESERVED—CONT.								
Haddock, smoked:								
Edible portion.....		72.5	27.5	23.7	.3		3.6	450
As purchased.....	32.2	49.2	18.6	16.1	.1		2.4	305
Halibut, smoked:								
Edible portion.....		49.4	50.6	20.6	15		15	1,020
As purchased.....	7	46	47	19.1	14		13.9	945
Herring, smoked:								
Edible portion.....		34.6	65.4	36.4	15.8		13.2	1,345
As purchased.....	44.4	19.2	36.4	20.2	8.8		7.4	745
Mackerel, salt:								
Edible portion.....		42.2	57.8	22	22.6		13.2	1,360
As purchased.....	22.9	33.5	44.6	17	17.4		10.2	1,050
Salmon, canned, as purchased.....		64.5	35.5	20.1	11.6	1.4	2.4	890
Sardines, canned, as purchased.....		56.4	43.6	25.2	12.7		5.6	1,010
SHELLFISH.								
Clams, long:								
Edible portion.....		85.8	14.2	8.6	1	2	2.6	240
As purchased.....	41.9	49.9	8.2	5	.6	1.1	1.5	140
Clams, round:								
Edible portion.....		86.2	13.8	6.5	.4	4.2	2.7	215
As purchased.....	67.5	28	4.5	2.1	.1	1.4	.9	65
Lobster, whole:								
Edible portion.....		79.2	20.8	16.4	1.8	.4	2.2	200
As purchased.....	61.7	30.7	7.6	5.9	.7	.2	.8	145
Oysters in shell:								
Edible portion.....		86.9	13.1	6.3	1.2	3.7	2	230
As purchased.....	81.4	16.1	2.5	1.2	.2	.7	.4	45
Oysters, "solid," as purchased.....		88.3	11.7	6.1	1.4	3.3	.9	235
Scallops, as purchased.....		80.3	19.7	14.8	.1	3.4	1.4	345
Lobster, canned, as purchased.....		77.8	22.2	18.1	1.1	.5	2.5	395

XXII.

TUBERCULOSIS IN CATTLE AND ITS CONTROL.*

PREVALENCE AND RELATIVE IMPORTANCE.

Our interest in tuberculosis centers in two leading questions: First, its prevalence in man; and, second, its diffusion among domestic animals which furnish food for man. If we consider the disease in man only, we must view it first in its sanitary relations, and, as regards the measures available for its restriction, in its moral bearings. If we consider the disease in the domestic animals we enter largely into its economic bearing, but in view of the use of these animals and their products for human food the sanitary and moral questions must also be admitted.

MAN—GENERAL MORTALITY.

In man it is admitted that, in civilized countries, where data can be secured, one death in seven is due to tuberculosis. Allowing fifteen deaths per 1,000 on our 70,000,000, this would furnish 150,000 deaths per annum from tuberculosis in the United States. Dr. Osler, of Johns Hopkins University, says this is a very low estimate. A war which should leave 150,000 dead on the battle field every year would rouse the nation to put a speedy end to the destruction. The mortality from tuberculosis exceeds the combined deaths from war, famine, plague, cholera, yellow fever and smallpox. Yet we have those among us who deprecate any intelligent measure for the extinction or restriction of this source of such a constant mortality and loss.

The mortality from tuberculosis in man rises far above this ratio when conditions are favorable to its propagation. In some large cities (Vienna) the ratio of deaths from tuberculosis is more than double what it is for the entire country. In the Marquesas Islands it rises to 33 per cent of the total mortality, and in some of our Indian reservations to 50 per cent. (Treon, Holden.)

TUBERCULOSIS IN ANIMALS.

Tuberculosis is rare in cold-blooded animals, but Sibley has seen it in *reptiles* in a state of confinement.

In *birds* it is common and destructive, but not readily transferred from bird to mammal. The bacillus of the bird is usually a modified form, which prefers a special avian habitation.

Wild mammals in confinement suffer excessively. In menageries apes die almost exclusively from tuberculosis, while kangaroos, deer, elk, gazelle,

*By James Law. The copy of this Bulletin and the cuts to illustrate it were kindly furnished by Cornell University, veterinary division, Ithaca, N. Y.

antelope, and lions are common victims. The rats, mice, and other vermin about our houses and barns also contract the disease and all must be recognized as possible bearers.

Cattle suffer more than any other domesticated animal, and tuberculous cattle are especially to be dreaded, seeing that they furnish so much food for consumption by man. The Danish herds which were said to be sound until after the importation of Schleswig and Shorthorn cattle in 1840 and 1850 are now generally infected, 17 per cent of the cattle slaughtered showing tuberculosis, while over 60 per cent of the dairy herds showed the disease under the tuberculin test. Statistics from German abattoirs give, for cows 6.9 per cent tuberculosis, for oxen 3.6 per cent, for bulls 2.6 per cent, and for yearlings and calves 1 per cent. In Berlin abattoirs 15 per cent proved tuberculous. By the tuberculin test of New York State herds (2,417 head) in 1894 16.75 per cent proved tuberculous. This is undoubtedly too high an estimate for the entire cattle of the State, as the herds were examined because the owners suspected them and requested examination by the tuberculosis commission. Yet it cannot be said that this represents the extreme of infection, as I have found one herd of sixty and another of 200 in country districts of this State tuberculous without exception. These represented cases in which no precaution had been taken to prevent contagion.

Swine are also very subject to tuberculosis, especially through the consumption of the uncooked offal of slaughter houses and of the milk of tuberculous cattle.

Rats and mice readily contract the disease from feeding in the mangers of tuberculous cattle and swine, and in their turn carry the disease from manger to manger and from barn to barn.

Rabbits, Guinea pigs and goats when left at large do not readily contract the disease, but are very susceptible to the infection when it is conveyed to them experimentally.

Horses, asses, dogs, cats and sheep do not readily contract the disease under ordinary circumstances, but this cannot be attributed mainly to insusceptibility since one and all take it easily when inoculated. The habitual immunity is therefore largely due to the absence of opportunity for infection, and in some degree also to the outdoor life and the well developed state of the muscular system and blood. For the house dog and cat infection has often come from eating scraps from the plate of tuberculous people and in some instances from licking up the expectoration. At Alfort only forty dogs were found tuberculous in 9,000 *post mortem* examinations. ;

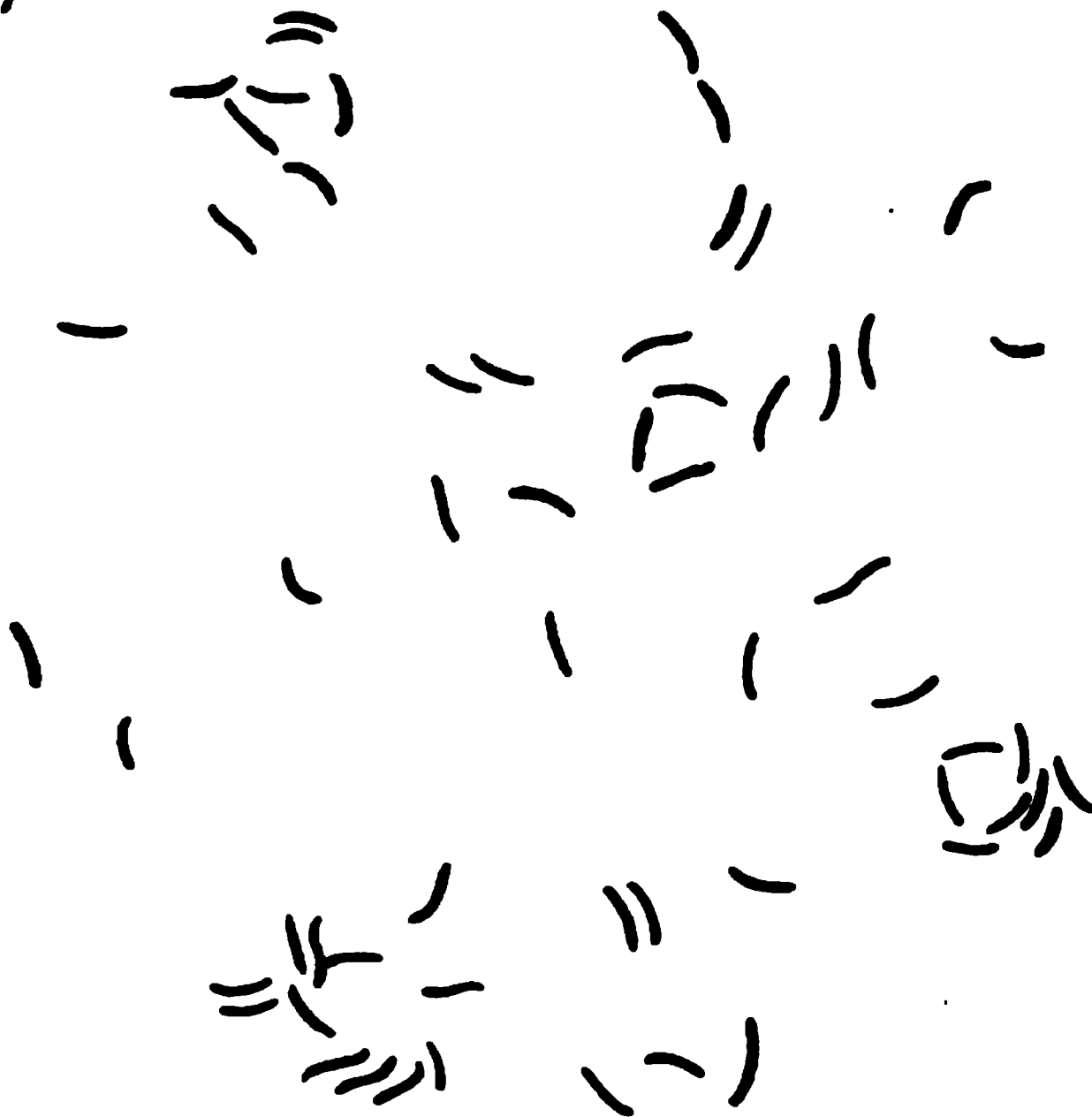
TUBERCULOSIS CONTAGIOUS.

That this disease is contagious was recognized by many of the medical lights of the sixteenth to the eighteenth centuries. Morgagni, Læmæc, Cullen, Wickman, Valsalvi and Sarconi, and for animals, Ruhling, Krunitz, Fromage, Huzard and others leave evidence corroborating this belief. The civil and ecclesiastical laws joined in forbidding the use of the meat from tuberculous animals, and in prescribing the destruction or disinfection of articles that might have become infected from tuberculous persons.

This was placed on a solid basis by the many successful experimental inoculations of the disease by Villemin in 1865 and by his numerous followers, who conveyed the disease by feeding tuberculous matter, and by causing the animals to inhale tuberculous liquid in the form of spray. Finally, Robert Koch, of Berlin, completed the demonstration, placing the keystone in the great arch of evidence, by the discovery of the tubercle bacillus, which he invariably found in the diseased tissues and in no others, and which he cultivated in pure culture in glycerine bouillon, and inoculated successfully upon a large number of animals.

Since that time (1882) his position has been corroborated by all competent observers, and there is no truth in medicine more thoroughly established to-day than the essential connection between tuberculosis and the

Fig 1.



1.—A drawing from a preparation of tubercle bacilli magnified about 1,000 diameters.

tubercle bacillus. This bacillus has been so often conveyed with destructive effect from man to the smaller mammals, and even to cattle, that the essential identity of human and bovine tuberculosis must be accepted. This statement requires the qualification that the bacillus, like other pathogenic germs, adapts itself to the conditions of the medium on which it grows, and therefore, in the first place to the particular genus of animals in which it has been living for some time, and is therefore often less ready to grow in one of another kind than in one of the same genus. The most extreme example of this is found in the bacillus of the bird which can only with difficulty be made to grow in the system of the mammal.

But even in the mammal the virulence of the bacillus for other mammals of a different genus or species may be very varied.

Theobald Smith obtained, from a pet bear that had been owned by a tuberculous master, bacilli which seemed to have no ill effect when inoculated on cattle, and had a somewhat reduced virulence for Guinea pigs. Kruse found bacilli from human sputum, and others from the lungs of cattle which produced only local tubercle in Guinea pigs.

Clinical observations show that the same is true as between different individuals of the same genus and species, and hence we find instances of tuberculosis in given herds, which continue for a number of years with few cases showing generalized and fatal results; and other instances of herds in which the disease makes rapid progress, soon affecting all or nearly all of the animals, and proving fatal to a number in rapid succession.

This modification of the germ by its surroundings is again well shown in the common experience that it is usually difficult to start (on artificial media in flask) the growth of tubercle bacilli taken direct from the animal, but when once started and accustomed to grow on such new materials, it may be started again in fresh culture with great certainty.

In stating, therefore, that the one and only cause of tuberculosis is the tubercle bacillus, it is not to be understood that it is affirmed that that bacillus is at all times, under all circumstances and to all animals, equally virulent and destructive. If the conditions are favorable it will prove very deadly, while, if unfavorable, it may linger for a time without producing much obvious effect on the general health. Its presence, however, in any herd is a constant menace to all members of the herd, to the attendants, to the consumers of the meat and dairy products of the herd, and to other herds into which members of this herd may be sent. It is also worthy of note, that the power of adaptation of the germ to its surroundings, introduces this further element of danger that, as it becomes adapted to its life in a given animal or in the different members of a closely bred herd, in the natural course of events it must become better and better adapted to survival in that particular animal and breed, and hence increasingly dangerous to all of its members. This is one reason why tuberculosis is so liable to become intensified in special herds of thoroughbred stock, and why common cattle with a varied ancestry will sometimes seem to offer a longer resistance to the affection. It may also explain the fact that with ample exposure the disease does not always pass from men to cattle and from cattle to man.

Yet it would be folly to argue from such data that the disease, when present in an occult form in a herd, may be safely ignored, and that the products of such herd may be safely consumed by man. The very adaptability of the tubercle bacillus sufficiently contradicts this conclusion. The mere continuous presence of the bacillus in a given system, human or brute, is the means of securing a better and still better adaptation to that form of life, and a greater and still greater measure of potency, so that when the health of the host or exposed animal is in any way reduced it may at once become deadly and far reaching in its evil effects.

CHANNELS OF INFECTION.

Among the channels of infection the following may be noted:

1. *Inhalation by the breath* — This is perhaps the most common method of infection and is usually followed by tuberculosis of the throat, lungs,

and lymphatic glands of the chest. Expectations and other infecting discharges are dried up and raised in dust so that they can be easily inhaled. Cases of this kind have been observed in buildings in which a victim of advanced tuberculosis was employed. The other employees fell victims, one after another, to the infection. They are quite common in infected barns, in which the virulent dust carried in the air is inhaled by a number of animals. Experimentally it has been shown by mixing virulent matters in liquids, atomizing them and causing animals to inhale the spray. In the hands of Villemin, Koch, Thaon, and Tappeiner this almost infallibly produced tuberculosis of the lungs. In man, too, many infections and reinfections have been traced to the dust from the soiled handkerchiefs. On the other hand it must be distinctly understood that the breath of the tuberculous is not in itself infecting, and if care is taken to prevent the diffusion of the infected solids and liquids and their distribution in dust, the presence of a tuberculous individual is not a threat to others adjacent.

2. *Infection through food and drink.*—A whole host of experimenters have conveyed the disease by mixing infecting pus or an emulsion of the tubercle with ordinary food. The same has been often accomplished with milk from the infected animal even to cases in which the mammary glands seemed to be perfectly sound. The danger of course is enhanced in ratio with the number of bacilli present, so that one diseased cow in a large herd leads to little infection if the milk of the whole herd is mixed. On the other hand such admixture of the virulent milk with the wholesome contaminates the whole to some extent, and inoculation with such mixed milk will often convey the disease when the animals drinking it do not seem to be injured by it.

The infection usually takes place through the tonsils, pharynx or bowels. In ruminating animals it may attack the first three stomachs, the contents of which are neutral or nearly so, but it rarely attacks the true digesting stomach, the secretion of which is strongly acid. The bacillus is liable to perish or to be so distributed by the acid in passing through the stomach that it is largely shorn of its danger. Among the conditions that favor its safe passage through the stomach may be named indigestion and a too rapid progress of the undigested food through the stomach, a condition which is especially common in young animals; overloading of the stomach: the ingestion of an excess of cold water just after a meal, thereby rousing excessive vermicular movement of the stomach and premature expulsion of its undigested contents: and the enclosure of the infected matter in a mass of fat which the gastric secretions are impotent to digest or emulsionize.

3. *Inoculation in wounds.*—This is a common channel of infection in man. Accidental inoculations—in making post mortem examinations have been often noticed since the case of Laennec; or in making artificial cultures in the laboratory; or in washing the clothes of tuberculous persons; or in dressing the tuberculous sores; or in making operations, notably that of circumcision; or inserting earrings formerly used by tuberculous persons; or in inhaling the infecting dust through a nose excoriated by a catarrh; or in handling infected carcasses in the butcher's shops; or finally through mouth or throat abrasions caused by hard indigestible materials.

4. *Through the mammary glands.*—This gland is especially subject to wounds by the horns and to sores and abrasions in connection with milking which form entrance-channels for the bacilli present in the dust of the barn. The opening of the teat is also a door of entry through which the germ may invade the milk ducts and glandular tissue. It is not to be forgotten, however, that the milk gland is especially liable to become infected through the blood which is sent in such enormous quantities through its tissues, and is liable to implant any bacilli which may have entered the blood stream. The gland is, therefore, especially liable to infection from without and within and once infected is a source of the greatest danger to the milk consumer.

5. *Through sexual congress.*—In cows the generative organs are often the seat of tuberculosis inducing nymphomania or sterility, and the disease has been repeatedly produced experimentally by smearing the infecting matter on the penis or introducing it into the vagina. The bacillus has even been found in the semen of an infected male, so that transmission by this channel to the female can be easily understood. All this has a very direct bearing upon the question of the propriety of using the same sire on the tuberculous and sound, and of the admission of females from tuberculous herds to be served by the sires in sound ones.

6. *Through heredity.*—Hereditary transmission of tuberculosis has long been recognized, and until recently accorded a rôle much more important than its infrequency would warrant. Various conditions militate against its occurrence; the foetus is essentially a carnivorous animal, living on the secretions of the dam and not on the direct products of the vegetable kingdom. It has, therefore, that measure of resistance which inheres in the flesh feeding as compared with the vegetable feeding animal. It may be infected through the semen of the sire, but the rule appears to be that the ovum thus early affected rarely attains to its full intrauterine development. It may be affected from the tuberculous generative organs of the dam, but here again abortion is liable to cut short the existence of the embryo. In spite of all drawbacks a certain small proportion of the offspring are affected with tuberculosis and come to the full period of gestation. In case of infection from the dam the disease is especially liable to attack the liver, in which so much of the placental blood at once circulates. Cases of the kind are recorded by Malvox, Brouwier, Bang, Lungwitz, Bärlund and Rieck, and in the tuberculous herd of a large public institution in New York several instances were noted.

The infrequency of such an occurrence may, however, be inferred from the fact that in 800,000 calves slaughtered only seven were found tuberculous.

INDESTRUCTIBILITY OF THE BACILLUS TUBERCULOSIS.

The bacillus may be said to be capable of surviving drying, the action of water and putrefaction. It is destroyed by heat (162 to 212 degrees Fahrenheit), sunlight, or in one month by heavy salting.

CONDITIONS WHICH FAVOR TUBERCULOSIS.

A personal predisposition to tuberculosis is a prime requisite, and this is rendered hereditary by close and inbreeding and breeding in line. Hence the great danger of tuberculosis among improved breeds. Again,

whatever undermines the health or stamina, such as breeding before maturity, breeding and heavy milking, breeding the old and debilitated, an insufficient ration, an ill-balanced ration which stimulates unduly the secretion of milk, ill health, local inflammations in the air passages, lack of ventilation, constant stabling in dark, damp, undrained stables and wet soils, greatly favor the reception of the bacillus. The impure air, lack of sunshine and accumulation of the germs in large cities make a destructive combination. In France, cities of under 10,000 lose 1.8 per cent yearly from pulmonary tuberculosis, while Paris, with its 2,000,000, loses 4.9 per cent. In Vienna hospitals 85 per cent of the bodies show tubercular lesions. In Bavarian monasteries 50 per cent of the young postulants die in a few years tuberculous. In New York City Charity hospital 30 per cent of all deaths show tubercle lesions. Where country cows are tuberculous to from 1 to 5

Fig. 2.

3—A drawing of a section of a very young tubercle in spleen. (Thoma.)

per cent, city cows are so from 6 to 20 per cent and upward. On the contrary our prairie and plains fat cattle show but .02 per cent tuberculous. In the southern states, with an unbroken outdoor life, country cattle are nearly all sound, whereas in large cities like New Orleans they are largely tuberculous.

APPEARANCE AND FORMATION OF TUBERCLE.

The term tubercle is drawn from the rounded nodular form of the diseased process. The bacillus lodged in the tissue multiplies and causes congestion and extraordinary growth of cells. The affected points may be at first no larger than millet seed, but these may increase and run together so as to form conglomerate masses of one, six or nine inches in diameter. As the cell growth increases, the central ones degenerate, die, and form a yellowish white, soft, cheesy mass (caseation) and these numerous cheesy centers become very characteristic of the disease. Sometimes the tubercle

developes into a hard fibrous mass the center of which may still caseate. In other cases it becomes calcareous or gritty, a condition which is usually associated with caseation. Sometimes the caseate mass softens into a whitish cream-like fluid.

COMMON SEATS AND SYMPTOMS OF TUBERCLE IN CATTLE.

Tuberculosis of the lungs may be chronic or acute. The chronic cases may last indefinitely with no other symptom than an occasional cough on leaving the hot stable for cool air, when suddenly raised in the stall, when made to run, or when drinking cold water or eating dusty food. The cough is usually small, dry, wheezing and repeated several times in succession. The general health may seem to be good, the subject may be fat or a heavy milker. To the trained ear, wheezing, crackling, or other unnatural sounds may be heard in the lungs or they may fall of detection. There may be a discharge from the nose, which when strained and placed under the microscope may show bacilli, but by cleansing the nose with the tongue the animal may make this test practically impossible.

Acute tuberculosis of the lungs on the other hand may prove fatal in a month. It is attended with rapid loss of condition, staring coat, elevated temperature, hurried breathing, frequent weak, husky or rattling cough, heavy, mawkish breath, and nasal discharge containing gritty particles or opaque yellowish masses. Pinching of the back, breastbone or spaces between the ribs, or striking the ribs with the knuckles may cause wincing, groaning or cough, and auscultation over the ribs may detect sounds of friction, wheezing, creaking, crepitation, rattling, or blowing, etc. Percussion over the chest detects areas of lack of resonance corresponding to the seats of tubercles or pulmonary infiltration. A significant feature is that these areas of flatness are distributed over the lungs, and not confined to one spot as is common in pneumonia. Appetite and rumination fall, bloating occurs after meals, the bowels may become irregular, and indications of tuberculosis in the throat, or superficial lymph glands may appear.

Tuberculosis of the stomach and bowels is common in young animals living on milk but is not infrequent in the mature animal as well. It may come from infected milk, or from the swallowing of the diseased products coming from tuberculous throat or lungs. In calves there may be noted indigestion, foetid diarrhoea, bloating, and finally cough and expectoration or swelling of the superficial lymph glands. In older cattle there may be irregular appetite and rumination, bloating after meals, costiveness alternating with diarrhoea, colics, and marked emaciation. The oiled hand introduced into the rectum may detect the enlarged mesenteric glands, which must be carefully distinguished from hardened faeces in the bowels, from the ovaries, from masses of fat, and from the cotyledons of the womb.

Tuberculosis of the womb and ovaries may depend on infection by the bull, or may be a complication of intestinal and peritoneal tuberculosis. It is usually marked by sterility, abortion, by frequency and intensity of oestrus, and by marked emaciation. Sometimes there is a white vaginal discharge.

Tuberculosis of the liver, spleen and pancreas is also a common accompaniment of infection of the bowel or abdominal cavity. The liver and spleen are especially liable to suffer from being on the line of circulation of the portal vein which brings blood from all the other abdominal digestive

organs. The lymph glands on the posterior aspect of the liver are especially liable to suffer. With liver-tuberculosis there may be jaundice accompanied by other symptoms of digestive trouble, but as in the affection of the spleen and pancreas there is oftentimes only an indefinite ill health.

Tuberculosis of the kidneys may be attended by extra tenderness of the loins to plucking and by frequent passage of urine, which may be discolored by blood or pus. The urine is likely to contain microscopic cylindroid casts and when stained these may show tubercle bacilli.

Tuberculosis of the udder is usually manifested by a circumscribed or general swelling of one or more quarters, without at first special tenderness, and this gradually extends to the whole gland. The milk may be watery, grumous, or even bloody and the lymph glands in front of the udder and behind are enlarged and hardened. The tuberculous nature of the lesions can only be certainly determined by the discovery of the tubercle bacillus in the milk, by the successful inoculation of the milk on a small animal, or by the tuberculin test.

Tuberculosis of the throat and pharyngeal lymph glands is one of the most common forms of tuberculosis in cattle. It causes a wheezing breathing, glairy discharge from the nose or mouth, difficulty in swallowing and a loose gurgling cough. The diseased glands may be felt as soft swellings around the throat, or as shrunken hard nodular bodies, or as masses fluctuating by reason of their liquid contents. When the disease extends to the interior of the larynx it causes a persistent, paroxysmal, husky cough.

The lymph glands inside the lower jaw or those near the root of the ear may swell up, soften and discharge a cheesy or thick creamy fluid containing the bacillus.

The lymph glands inside the chest—bronchial, mediastinal, etc.,—are especially liable to suffer, as they receive the infected lymph which comes from the diseased lungs. These often suffer when no lung disease can be found, the bacilli having passed through the lungs without forming any primary lesion in that organ, or those that have been formed having healed. These are often attended by no distinctive symptoms, and require the tuberculin test.

3.—Drawing of tuberculosis spleen in pig, showing tubercles 2-3 the natural size.

Lymph glands in front of the middle of the shoulder blade may be suspected if of unequal size and form on the two sides, if hard and nodular, or if soft and fluctuating. They rarely caseate and burst.

Other lymph glands that may be similarly affected, and that are superficial enough to be felt, are the *glands at the entrance of the chest* in front of the two first ribs, the *glands on the flank* above and in front of the stifle, and, in the young, the *glands situated high up in the groin*.

Tuberculosis of the bones and joints is seen in young growing animals, affecting especially the large joints of the limbs, the elbow and knee, the stifle and hock, but also at times the bones and joints of the digits. The ends of the bones become enlarged and tender and the joints overdistended, tense and elastic. The lameness may be extreme.

PROPORTION OF OCCULT CASES.

In herds which have the disease in the most intense form, by reason of long standing, indoor life, and repeated reinfection nearly all may be detected by the objective symptoms, but in such herds nearly every animal is diseased. In ordinary herds, where the disease is less intense, at least two-thirds of the diseased animals would escape under such an examination. In one herd of seventy head in which the tuberculin test condemned twenty-four head (being 40 per cent of the mature animals) I left the examination after slaughter to the veterinarian of the A. J. C. C. who was at the time skeptical as to the value of the tuberculin test. He wrote me afterward of his surprise at finding every one of the twenty-four condemned animals tuberculous, when not one of them had shown symptoms by which he could recognize the disease in life. This is no exceptional case, and may be advanced rather as a typical example of the ordinary infected country herd.

It is manifest that if we aim at speedily and certainly clearing a herd of tuberculosis we must have some better method of diagnosing the disease than by the best physical examination. Attempts have been made to discover the bacillus in the expectoration, milk or nodular lymph glands, but this requires prolonged careful manipulation in almost every case, and, in case of no bacillus being found, is no guarantee of the absence of the disease.

Inoculations with the suspected discharges, secretions or tissues, demand a delay of one or two months before one can pronounce upon the result, and that result, if negative, gives no assurance that the animal is free from tuberculosis, but only that the material inoculated did not contain the germ.

THE TUBERCULIN TEST.

Much has been said and written against the tuberculin test by those who have never used it, and who are therefore utterly incompetent either to endorse or condemn it, but for those who aim at the prompt and thorough eradication of the infection from a herd, and at the securing at once of a guarantee of progeny, beef and dairy products, no resort can, as regards its efficacy, be at all compared with the tuberculin test.

Tuberculin is a sterile solution of the products of the artificial culture of the tubercle bacillus. In its preparation it has been treated to a boiling temperature which is as fatal to a tubercle bacillus in liquid medium as it is

Plate I.—Photograph of a section from anterior lobe of a tuberculous lung of a cow, showing rounded tubercular infiltration and calcified centres.

Plate II.--Photograph of a portion of tabercular omentum of a cow, showing the tubercles, natural size.

to a hen's egg. But this is not all, even the dead bacilli have been separated from the liquid by passing it through a porcelain filter. The remaining liquid (tuberculin) is absolutely sterile and can plant and propagate neither the tubercle bacillus nor any living thing. It can poison if given in excessive doses, as alcohol can poison, but it can no more produce the germ of tubercle where that does not exist than can distilled alcohol plant the yeast germ and start a new vinous fermentation. The insane fear of tuberculin is the fruit of an ignorance of its true nature and of a blind prejudice which withholds its victim from informing himself on the subject.

As we produce tuberculin in the bacteriological laboratory of the N. Y. S. Veterinary College, and distribute it free, for use by approved parties in this State, we can speak with confidence of the absolute harmfulness of the agent when intelligently employed. We aim at securing no profit in making this agent, but charge only for packing and shipping. We have therefore no interest in its manufacture, for on the contrary the greater demand from residents of this State for tuberculin the more unremunerated labor is heaped upon us.

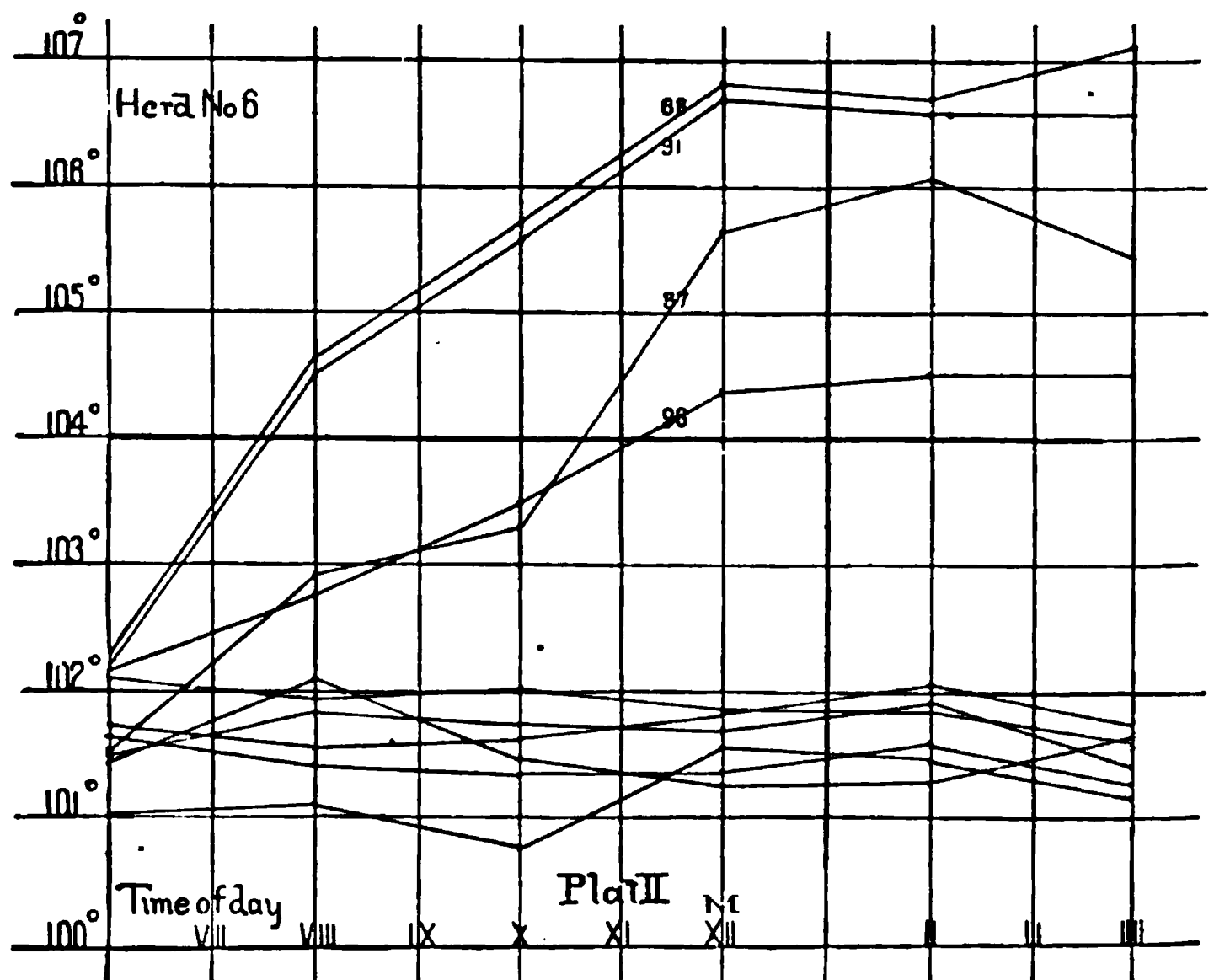
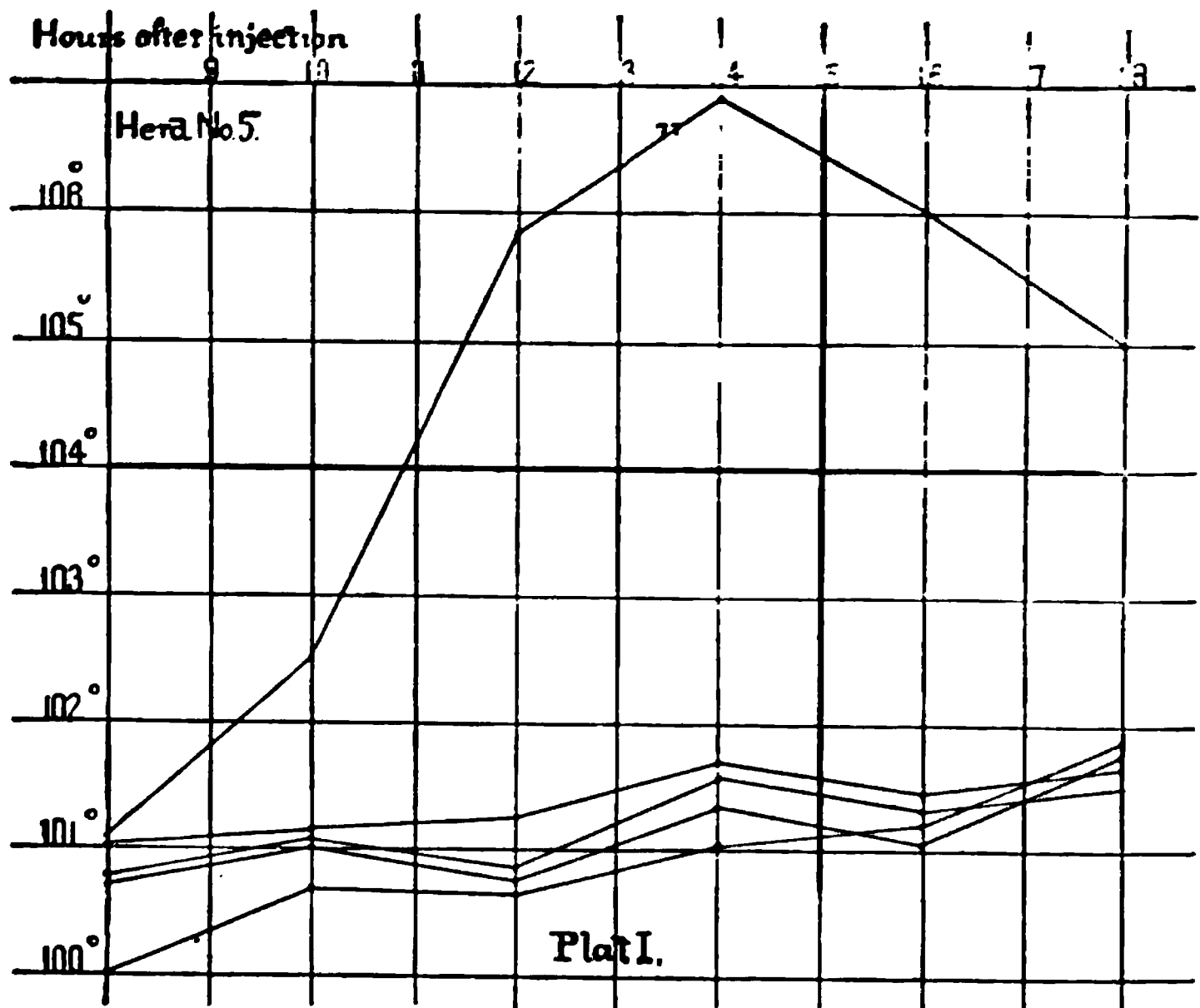
The value of the agent consists in this, that the hypodermic injection of an appropriate dose in a tuberculous animal, however lightly affected, produces in the course of the succeeding twenty-four hours a rise of body temperature and other indications of fever. The gradual rise and fall of the temperature in the absence of any other diseased or physiological condition which would bring this about is the most reliable of all symptoms of the presence of the disease. Upon the sound animal system such a dose of tuberculin produces no appreciable effect.

It is important, however, that I should not be misunderstood in this matter. The man who will use tuberculin without due caution and without due consideration as to the condition and environment of the animal, and who blindly condemns on any rise of temperature will almost certainly condemn non-tuberculous animals and bring the tuberculin test into discredit. The intelligent use of the test demands an intimate knowledge of the kind of animals tested, both in the healthy and diseased condition, and a careful scrutiny before and during the test.

First.—The subject must be in good general health. If there is present in the system any concurrent disease it may undergo an aggravation within twenty-four hours and give a rise of temperature that will be mistakenly set down for tuberculosis. At the very start, therefore, it is important that the general health of the subject should be first assured by a critical professional examination. If some other disease is present the tuberculin test had best, as a rule, be delayed until that has subsided, while if tuberculosis is found the test will be superfluous.

Second.—The subject must not be within three weeks of parturition, nor about to abort. In many cases, though not in all, as preparations are made for calving, the system becomes unduly susceptible to the presence of tuberculin and that agent will cause a rise of temperature, though no tuberculosis is present. Unless this source of error is carefully guarded against the most valuable cows in the herd may be condemned unjustly.

Third.—The cow must not be within three days of the period at which "heat" would naturally occur. Under the excitement of œstrum the body temperature usually rises two or three degrees, and if tuberculin has been



TEMPERATURE CHARTS

- 4.—Temperature curves of five cows, all of one herd, under the tuberculin test. No. 77 was tuberculous, the other healthy.
- 5.—Temperature curves of ten cows, all of one herd, under the tuberculin test. Nos. 68, 87, 91, and 98 were tuberculous, the others healthy. (Curtice, Report of the Bureau of Animal Industry, 1893-6.)

used this rise may be attributed to tuberculosis and a sound animal may be condemned. Nor is it always enough that the animal is supposed to be pregnant. Abortions sometimes take place unexpectedly and unknown to the owner. If, therefore, a cow under the test and which is not well advanced in pregnancy should show a rise of temperature, it should be at once ascertained whether the animal is not in "heat." If symptoms of "heat" are found she should be set aside along with any calving cows to be tested again when such a source of error is no longer present.

Fourth.—The tested animal must not be exposed to a hot sun in a closed area. In excess this will cause heat apoplexy, and the fever heat which ushers this in may easily be mistaken for the indications of tuberculosis.

Fifth.—Cattle taken from pastures must not be enclosed in a hot, stuffy stable. While they must be tied up to allow the temperatures being taken at short intervals, coolness and ventilation should be secured in summer by a sufficient air space and the requisite ventilating openings.

Sixth.—Exposure to cold draughts between open doors and windows, or to wet or chilly blasts out of doors should be carefully guarded against. A chill proceeding from any source and alike in the presence or absence of tuberculin causes a rise of the internal body temperature.

Seventh.—Heavy cows unaccustomed to stand on hard boards may have a rise in temperature in connection with resulting tenderness of the feet. One must avoid hard floors on the day of the test or make examination of the feet and allow for attendant fever.

Eighth.—Omission of the previous milking or a change of milker and consequent retention of part of the milk will raise the temperature of a nervous cow, and in careless hands secure an erroneous condemnation.

Ninth.—Privation of water at the regular time will often cause rise of temperature especially when on the dry feeding of winter. I have seen a general rise of two degrees and upward from the delay of watering for a single hour, while after watering the temperature went down to the normal and remained so. Water always tends to a temporary lowering of temperature but in the presence of tuberculosis it soon rises again.

Tenth.—Change of food is liable to produce a slight indigestion and rise of temperature. This should be avoided as far as possible, and when a herd is taken up from pasture for the test it should have grass, ensilage or other succulent food.

These are examples of the sources of fallacy which attend on the reckless and unintelligent use of tuberculin. They only show that skill and training are necessary to its successful use, and that in the absence of these the apparent results are not to be too unhesitatingly accepted. In all cases, in the absence of the requisite education and experience it is desirable that the animals which have shown a rise of temperature should be separated from the herd and tested anew after the lapse of three or four weeks. In this way such errors may be almost entirely excluded.

Eleventh.—An animal with advanced tuberculosis sometimes fails to react. The subject is, however, usually emaciated and bloodless, breathes hard and has rapid pulse on exertion and shows unequivocal symptoms of tuberculosis to the skilled examiner. Such cases, can, therefore, rarely escape a physical examination. They are noticed mainly to guard against

the mistake of making the rise of temperature or its absence the sole test of tuberculosis.

Twelfth.—It is objected to tuberculin that it detects even the slightest and most latent cases of tuberculosis, some of which would recover and many would remain useful for years. This objection would be valid if our object were to obtain the greatest possible money return from the individual tuberculous cow at the expense of any risk to the sound herd. But tuberculin is, and should be used for the purpose of a complete eradication of the tubercle bacillus from the herd and the preservation of a sound stock which with its products will be above suspicion. If this is not aimed at; if the latent cases are to be retained in the herd and the advanced cases only removed then truly tuberculin should have no place in your system. Physical examination should be all sufficient for your purpose. But you could not place the herd at once above suspicion, you could not sell its members with a guarantee of soundness, and you could not assure the consumers that the uncooked dairy products were safe.

The animal with local tubercle may not at the present time be diffusing the poison, but where such animals are preserved one will at intervals have the local tubercle extended so as to cause generalized tuberculosis; and as this extension necessarily takes place by the conveyance of the bacillus through the blood, and as such bacilli must be circulating in the blood before they can invade new tissue and form new tubercles, it follows that there is always a period between the entrance of such bacilli into the blood and the development of new tubercles in which the blood and all blood-containing organs are infecting, though no symptom nor lesion of new tubercles can be detected. At this stage the animal may convey tuberculosis through its flesh, or through its dairy products, while even a post mortem examination would pronounce it free from generalized tuberculosis. It is also liable to distribute the germ to other members of the herd before any suspicion of immediate danger is entertained.

Deduction.—It may be concluded from such considerations as the above that the tuberculin test is indispensable where one aims at a guarantee of the soundness of the progeny and dairy products of a herd, but that its use demands one of two conditions.

A. That the animals showing tuberculosis under the test should be destroyed and the buildings where they have been shall be disinfected; or,

B. That such infected animals, as have the disease in a latent form, shall be formed into a separate herd and kept well apart from other stock, for breeding purposes only; or if their milk is used that it shall be first subjected to sterilization.

The stockowner who values the sound portion of his herd cannot afford to allow even the latent cases of tuberculosis to mingle with it.

TUBERCULIN IN MODERATE DOSE HARMLESS TO SOUND CATTLE.

The concurrent testimony of all veterinarians drawn from hundreds of thousands of tests is that the ordinary test dose is harmless to a nontuberculous animal. In 1894 I put this to a crucial test on five cows (Holstein, Jersey and grade) injecting the tuberculin on six successive occasions and found that it produced no appreciable change in the general health as evidenced by temperature, breathing, pulse, yield of milk or quality of milk.

I feel accordingly that I can speak with the greatest confidence as to the entire harmlessness of the tuberculin test on a sound animal.

That it rouses into a temporary activity the tuberculosis already existing in the unsound animal is true. Were it not so it would be useless as a diagnostic agent. But if the State stands ready to destroy and pay for the diseased, there can be no possible objection to the temporary aggravation which leads to the purification of the herd.

MEASURES FOR THE ERADICATION OF TUBERCULOSIS.

For the complete eradication of tuberculosis from a herd or country the first and main consideration is the absolute separation of the sick animal and all its products from the healthy. This is fundamental in dealing with all infectious diseases, and if it could be applied would reduce all contagious disorders to the condition of simple sporadic ones. Plagues would cease to be plagues, and the infecting disease would cease like any other affection with the first individual case. The plagues of men follow the great movements of men—pilgrimages, armies, trade. The animal plagues prevail continuously in unfenced territories (Asia, Central Europe, Australia, Tasmania, New Zealand, South Africa), and follow the tract of armies and the channels of commerce. Stop the great accumulations and intermingling of animals and we arrest the general diffusion of a plague and reduce it to the comparatively insignificant importance of some common disease.

Exceptional cases like anthrax and blackquarter in which the germ is maintained for years in the soil, are only apparent exceptions to this fundamental principle, as whenever the germ can thus be carried in soil or water the separation of sick and their products from the healthy is incomplete.

In applying this principle to tuberculosis we meet with the drawback that a great variety of animals of different genera are susceptible (including the human being) and that it is difficult to keep all these and their products apart, and that further it is not in our power to cut short the disease abruptly in the human race as it is in the lower animals. There is, however, the counterbalancing advantage that its propagation is slow and takes place less readily through the air than in the case of most infectious diseases.

BREEDING HEALTHY STOCK FROM PARENTS WITH LATENT TUBERCULOSIS.

Where the State is not pledged to exterminate the disease by prompt and radical measures, it is quite possible to raise healthy stock from sires and dams that have tuberculosis in a slight and latent form. It will be recalled that calves are usually born free from tuberculosis. In the slaughterhouses of Europe there may be but one tuberculous calf in 100,000 killed. If, therefore, the calves can be preserved from infection of a parental source they may be raised absolutely sound with very few exceptions. For valuable pedigreed animals especially it is quite possible for the owner to keep those with latent tuberculosis in secluded herds, to remove the calf from its dam as soon as born, and to raise it on the sterilized milk of the dam or on the milk of another and healthy cow.

In such a case it is always desirable to employ the tuberculin test upon the entire herd, to destroy at once those animals that have advanced or generalized tuberculosis, and to separate in a new or disinfected barn under special attendants the cows that have been attested sound. There will remain the slight and latent cases which have reacted under the tuberculin, but which are well nourished, having healthy skins, eyes and appetite, and no cough, wheezing nor shortness of breath. These must be kept well apart in separate barn and pasture where neither they nor their products can come in contact with healthy stock, where they can have good air and nourishing food. Their calves must be kept in a separate building or park, and fed on the milk of sound cows, or on that of their dams after it has been raised to the boiling point for fifteen minutes. After sterilization the milk must be put in scalded vessels reserved for the use of the calves, and fed by the special attendants. Any loss of condition, unthriftiness, cough or scouring on the part of the calf, should be the warrant for separating it from the others and subjecting it to the tuberculin test, and for its destruction in case it shows the tuberculin reaction.

The cows should also be carefully watched and in case any one develops cough, wheezing, breathlessness on exertion, or other sign of actively advancing tuberculosis it should be at once destroyed as endangering the others by possible reinfection. The whole isolated tuberculous herd should be submitted to the tuberculin test, every three or six months, and individuals which fail to react on two successive tests, and which show all other indications of good health may be held to have recovered and may be restored to the healthy herd.

A second method is that pursued successfully in the northwest territories. Cows and heifers that have reacted under tuberculin, but which otherwise appear to be in good health, are made into a herd by themselves and placed on a special range apart from all other cattle. They live in the open air, with slight shelter in winter and their calves are allowed to suck their dams running with them all winter. The wide range, the open air life, and the early destruction, by sunshine and oxygen, of the discharged microbes, tend in the main to ward off infection except such as comes in the milk, and as a matter of fact the majority of the calves grow up in apparent good health and are fattened and shipped to England.

The climate of our southern states affords a better opportunity for this practice than does the semi-arctic northwest. There the ranch cattle living in the open air all the year round show little or no tuberculosis, and with this outdoor life the genial climate will greatly favor the survival if not the recovery of the slight and latent cases. It should be added that in the stabled cows of the southern cities tuberculosis is very prevalent.

EXTINCTION OF TUBERCULOSIS WITHOUT THE TUBERCULIN TEST.

As successful examples of this I may quote from my own personal experience.

First.—A herd of about 200 head belonging to the Willard Asylum had become badly affected with tuberculosis and on physical examination, without the use of tuberculin, I condemned about 50 per cent. These were accordingly destroyed and new barns and yards were constructed at some distance from the others and filled with cows selected from the most healthy herds available. These were bred to healthy bulls and a new herd

gradually built up. Meanwhile the remaining 50 per cent of the original herd were gradually slaughtered, and like the original half of the herd were found to be tuberculous without a single exception. The original barn was thoroughly cleaned, repeatedly disinfected with chloride of zinc and with its cleansed and disinfected yards was left unoccupied for an entire year. The fields on which the original herd had pastured were used for other purposes than pasture for two full years. The new herd was carefully watched and any cow which contracted a cough or showed especially poor health was at once separated from the herd and disposed of. This treatment of the new herd was kept up for over twelve years, and in the middle of December, 1897, I subjected the mature animals of the herd to the tuberculin test, and found not a single case of tuberculosis. I have never before subjected an untested herd of this size to the action of tuberculin without finding a considerable percentage of cases of tuberculosis. The splendid showing is highly instructive as to the high value of intelligent management even without the aid of tuberculin. Here a large herd was maintained under the same conditions of food, milking and housing (even in the same barns) as the former herd which became universally tuberculous, and, even under the crucial test of the tuberculin, furnished not a single case of tuberculosis. The only difference is that with the present herd intelligent measures were taken to exclude the germ of the tuberculosis. The case is all the more striking that some of the most important precautions against the spread of tuberculosis in a herd were not put in force. The cows were not taught to keep the same stall on all occasions, but went into any stall that was convenient. Then there were no partitions between the feeding places of adjacent stalls and one cow could lick up the food from the two stalls on the right and left as well as from her own. With an infecting cow in the herd, therefore, there was every opportunity for a speedy spread of the infection. In spite of such obvious opportunity for infection the careful selection of the first members of the present herd, the building up of the herd by home breeding only, and the weeding out of all suspicious animals succeeded in excluding any trace of tuberculosis.

The experiment, however, entailed the entire destruction of the original infected herd, and though the post mortem examination showed that in this instance this step was necessary to a successful result, yet in many other less universally diseased herds the larger part could have been saved by picking out the diseased with the aid of the tuberculin test.

Second.—In Cornell University herd, which numbers about sixty cattle, old and young, tuberculosis led to the destruction of a number of individuals. The diseased, however, were disposed of as soon as objective symptoms showed the presence of tuberculosis, and after some years of this weeding out when I tested the whole herd with the newly discovered tuberculin I could find no trace of the disease except in a young bull which had recently been acquired from another herd. Since his destruction I have tested them repeatedly, but have found no trace of tuberculosis.

EXTINCTION OF TUBERCULOSIS WITH THE AID OF TUBERCULIN.

If a herd has been bred up from home stock without the introduction of any animal from without, and if for a number of years there have been no losses and no illness suggestive of any form of tuberculosis there is a fair

presumption that it is free from that disease. But in the average herd, and especially if sickness or death has occurred, even if such has been attributed to something else, it is a wise precaution to subject the whole to the tuberculin test. Especially now when the N. Y. State Veterinary College undertakes to furnish tuberculin free for use in herds in this State, the expense of such a test should not be a serious drawback. The measures to be adopted may be thus enumerated:

First.—Apply the tuberculin test to the entire herd.

Second.—Remove all animals showing a rise of temperature which indicates tuberculosis.

Third.—Destroy and burn, boil, or deeply bury all cases of the disease, unless it is decided to form an isolated herd of latent cases which are in good condition. (See above.)

Fourth.—In case of doubt or disturbing influences which may have caused rise of temperature (nearer to calving, heat, exposure, concurrent disease, changes in management, etc.), keep the suspected animal apart for three or four weeks and test again. This will almost certainly correct any mistake of the first test.

Fifth.—Repeat the test every three months and if two successive tests show no indication of tuberculosis the herd may be accounted safe.

Sixth.—As soon as tuberculous animals have been removed from a stable let it be vacated and thoroughly disinfected with chloride of lime, four ounces to a gallon of water and enough quicklime to make a good white-wash, which will show if even a square inch has been missed. When chloride of lime is objectionable because of its tainting the milk, mercuric chloride may be used in the proportion of one drachm to a gallon of water, to which is added one drachm of sal ammoniac and five drachms of common salt. This is much more poisonous than the chloride of lime and must be cautiously handled during its application. The walls, roof, and especially the floor, gutter and feeding trough must be first thoroughly scraped, washed and cleaned; all rotten woodwork must be removed, and in case of double boarded walls, the boards must be removed on one side to permit of a thorough application.

Seventh.—In making new purchases avoid any herd in which tuberculosis has appeared, or which has had sickness or deaths in recent years.

Eighth.—Don't purchase from city, suburban nor swill stables.

Ninth.—Don't take a cow which is in ill health or low condition, especially one with cough, nasal discharge, foul breath, hard nodules under the skin, diseased udder, swollen loins or joints, or a tendency to scour or bloat.

Tenth.—Test every fresh animal with tuberculin before admitting it to your herd, unless it has been recently tested and has not since been exposed to possible infection.

Eleventh.—Don't admit strange cattle to house, field or yard with your own. Keep them apart until tested with tuberculin.

Twelfth.—Keep each animal in your herd strictly to its own stall and manger.

Thirteenth.—Board up the partitions of the stalls in front so that no two cows can feed from the same manger nor lick each other.

Fourteenth.—Be especially observant of the older cows, and on the slightest sign of ill health separate and subject to the tuberculin test.

Fifteenth.—In case a herd of cattle is found to be tuberculous subject to the tuberculin test all the domestic animals that have mingled with them freely and fed from the same troughs. Remove those that show a reaction.

Sixteenth.—Exterminate the vermin (rats, mice, sparrows) in a building where tuberculosis has prevailed.

Seventeenth.—Let no consumptive person attend on cattle or other live stock, nor prepare their food.

EXTINCTION OF TUBERCULOSIS BY STATE ACTION.

It is out of the sphere of the private breeder or dairyman to enter on the question of state sanitary police, yet no one is more deeply interested in the general enforcement of such measures as would banish the existing dangers which attend on the purchase of strange animals and their products. In recent years the rigid supervision of herds in the New England States has driven many infected cattle into New York to spread tuberculosis in previously healthy herds, and to increase it in those that were already affected.

The exclusion of cattle seeking to enter Pennsylvania or the New England States, which were not accompanied by the certificate that they had successfully stood the tuberculin test, has led to the testing of western cattle at Buffalo, Albany and elsewhere, and the detention of such as failed under the test, to be sold too often to the unsuspecting New York stockowner. The tests have often been made by the inspectors of the Bureau of Animal Industry, who have no legal right to interfere with the condemned cattle unless the attempt is made to move them into another state, and in the absence of any restriction by the municipal or state health officers, the owner or dealer is at liberty to sell such tuberculous cattle in open market.

If the test is made by a veterinarian who is not a national nor state official the same holds true; he has no authority to forbid the sale of the diseased and condemned cattle.

Again, private stockowners have had their own herds tested, and have removed from the herd those that failed to stand the test, but there is nothing to show what became of such condemned animals, and in the absence of a state indemnity and slaughter, there is much to be suspected.

These are hints of the evils that have been precipitated for a length of time upon our New York live stock industry. Day by day our herds are being systematically infected by the introduction of the tuberculous off-scouring of other states and of our own, and we raised not a finger to stop it.

Farther, in the interests of the consuming public we have to consider that we have no inspection in our little local abattoirs and no guarantee of the meats there killed. And meanwhile we are giving free rein to every evil disposed dealer, to add to our herds the tuberculous animals drawn from the states around us.

The crying need of New York to day is first to block these streams of infection, which are now practically invited into our herds from other commonwealths, and second to inaugurate a systematic effort to rid our own herds, which are the sources of our dairy and meat products, from this scourge.

XXIII.

THE RELATION OF BOVINE TO HUMAN TUBERCULOSIS.*

The following paper on the above named subject has been prepared with much care and research. While the Secretary fully agrees with the Doctor in his contention as to the danger from the meat and milk of tuberculous cows, he is not yet inclined to the view that there is but little fear of transmission of the disease from man to man by the inhalation of disease germs. The consensus of opinion on this subject seems to be that man is himself his greatest enemy.

The paper, however, has great merit and is entitled to respectful consideration:

MR. PRESIDENT, LADIES AND GENTLEMEN—Perhaps you, my hearers, are not in accord with him who sang "Tell Me the Old, Old Story, Tell It Again," but I trust that you will bear with me for a short time while I give you a somewhat recent version of the old, old subject, "Tuberculosis."

I say the old, old subject, for history from the earliest times to the present day is replete with accounts of a disease that to-day we term tuberculosis.

Various terms have been used to designate the disease, and numerous theories have been advanced to explain its etiology and pathology. Often these theories confounded this with other and entirely dissimilar diseases, and until recently several of the localized manifestations of the disease were considered as separate and distinct diseases.

At one period the disease would be considered contagious and at another not so. These changes in the prevailing theories have been much more marked and frequent among physicians than veterinarians. Theory could not convince the veterinarian that the disease was not contagious, when he saw it spread gradually, yet surely, from one animal to another under favorable conditions.

But it was not until the latter half of the Nineteenth century that the etiology and pathology of this "great white plague" were placed upon a sound basis, through the works of Villiman and Koch.

Notwithstanding the fact that much has been accomplished since these discoveries were made, there remains many phases of the subject to be

D. V. M., Government Inspector, Sioux City. Read before the Sioux Valley Medical Association, June, 1899.

worked out. One of the most important of these problems yet to be solved is the relation existing between human and bovine tuberculosis. And it is this phase of the subject that I wish to present for your consideration this evening.

Succinctly stated the proposition is that tubercular lesions, wherever found, are the direct results of the action of the tubercular bacillus; and further that the domestic cow is the natural harbinger of this bacillus; or in other words, tuberculosis was primarily a disease of the bovine specie, and is found in man and other animals as a result of transmission; brought about through the ability of the tubercular bacillus to adapt itself to the various conditions, as found in the various animals.

I fully appreciate the fact that this position is not in accord with the prevailing thought of the medical profession; but it would be a waste of time and energy, yours and mine, for me to present thoughts fully in accord with yours.

Assuming that it is generally agreed that the disease is transmissible from one animal to another and from various species to others, man included, I shall confine my efforts to a brief resume of some of the facts that indicate that tuberculosis is naturally a bovine disease.

PREMISES.

If we find that a certain disease is always prevalent where certain conditions prevail, the world over, and that it is never prevalent where these conditions do not exist we have at least very strong presumptive evidence that these particular conditions must exercise a greater or less influence upon the distribution and spread of this disease.

This fact having been established it at once places the disease in a new light and suggests very important factors, in relation to the control or eradication of the disease.

If this premise is tenable and susceptible of logical deduction, and I believe that it is, such factors should always be considered in dealing with any disease but more especially a contagious one.

In following out this line of thought a brief examination of some of the various conditions in which we find tuberculosis most prevalent may present a new phase of the question.

CLIMATE.

While a dry, temperate climate may have more or less favorable influence upon the progress of the disease, we know that no set of climatic conditions, as to heat or cold, dryness or moisture, constantly prevails, for we find that the disease is prevalent in various sections from the torrid to the frigid zones.

Again altitude, while it has in most places a marked influence on the progress of the disease, has but little influence upon the distribution of it, as is shown in the fact that certain peoples inhabiting the Dead Sea basin, which is between 100 and 200 feet below the sea level, are free from tuberculosis, whereas it is more or less prevalent among most people inhabiting the mountainous regions of Europe and America.

Civilization is not a constant factor in the distribution of this disease, for some of the savage and semi-civilized peoples are seriously afflicted with tuberculosis.

Other things being equal, we find the disease more prevalent the denser the population; but density of population is not a constant factor in the distribution of this disease, for we find that the masses of the people of China and India, two of the most densely populated countries of the world, are comparatively free from tuberculosis, whereas the disease is quite prevalent among the farmers of Europe and America.

Filth and poor sanitation have a marked influence in hastening the development of the morbid processes, but they are not constant factors, and exert but little influence upon the distribution of the disease, for we find it all the way from the wigwam to the palace.

Thus we find that while the various conditions of climate, altitude, sanitation, etc., exert more or less influence upon the development of the morbid processes, they have but little influence upon the distribution of the disease.

Perhaps you are saying that tuberculosis is so widespread and is prevalent under such diverse conditions that there are not and can not be any constantly associated factors in its distribution.

Nevertheless, a careful study of the geographical distribution of tuberculosis reveals the fact that all peoples who use the milk and flesh of the domestic cow (the in and inbred cow) as food products are more or less afflicted with tuberculosis. And further that there is usually a very uniform ratio between the quantities of such foods consumed and the prevalence of the disease among the people.

On the other hand, all of these peoples who do not use the food products of the domestic cow, are comparatively free from the disease.

The exceptions to the above are those communities where there are a greater or less number of transient tubercular patients, or where a greater or less percentage of the inhabitants are tuberculous subjects who have migrated to these special localities that they might receive such advantages as climatic conditions and altitude might afford.

A short resume of the geographical distribution of the disease will, I think, justify this statement of facts.

Prof. E. F. Brush, M. D., of Mount Vernon, N. Y., in a paper read before the New York Academy of Medicine, April 18, 1899, makes the following statement: "This insidious and delusive disease is not the result of civilization, as is generally supposed. Barbarous and semi-civilized races are afflicted as severely as many of the most advanced civilized races."

"Neither geographical position nor climatic conditions are a factor in the distribution of pulmonary phthisis. Every known part of the globe, with a few isolated areas excluded, is a habitat of the disease. After several years of close study of the affection, and consulting all accessible statistics and the habits of the people where the disease prevails.

"The only constantly associated factor is found, in my opinion, in the inbred bovine specie, without any regards to the social position of a community or its geographical habitation, terrestrial or atmospheric condition. If a community is closely associated with inbred cattle tuberculosis is prevalent."

In the fifteenth annual report of the State Board of Health, of New York for the year 1895, on page 729, may be found the following: "Human

tuberculosis coextensive with bovine tuberculosis. Broad generalizations of our knowledge shows a close parallelism between the numbers of dairy cows and the prevalence of tuberculosis in the human race. Countries that have few or no cattle, or in which the herds are mainly kept in the open air, and are therefore largely protected from the disease, show as a rule little tuberculosis in man."

EUROPE.

In the European countries cattle have existed and tuberculosis has prevailed in man, to a greater or less extent, for centuries. Some special localities will be mentioned later.

In some of the more recently civilized countries we find that tuberculosis was very rare or unknown before the introduction of the domestic cow.

AUSTRALIA.

During the early settlement of Australia by the English, tuberculosis was so rarely seen as to give strength to the idea that the climatic conditions of the country were incompatible with the disease. But with the advent of cattle raising, which began to be carried on extensively in 1821, consumption began to appear among the people and it has gradually increased as has cattle raising, until the disease has become nearly as prevalent there, notwithstanding the delightful climate, as it is in the mother country, England.

NEW ZEALAND.

A similar condition prevails in New Zealand. Previous to the colonization of this country by the English, phthisis was unknown among the Maories. But with the advent of the Englishman's cow, tuberculosis became a veritable scourge to this simple people, that threatens the extinction of the race if measures are not taken to control its spread. As Hirsch has so well put it: "In my opinion the death rate from phthisis will keep on increasing in that locality if the breeding of cattle is not properly regulated by law." This statement of Hirsch means that tuberculosis must be controlled in the cattle or the Maories must go.

SOUTH AFRICA.

In South Africa we find a different condition. The early explorations of the white man revealed the fact that the principal vocation of the coast tribes was cattle raising. And owing to the peculiar customs of these tribes, their cattle were very closely inbred. It was also noted that tuberculosis, of a very malignant type, prevails among these tribes. Whereas the tribes of most of the interior parts of Africa, who have no domestic animals because of the Tsetse fly, are free from tuberculosis.

MADAGASCAR.

The native tribes of this island have comparative large herds of cattle, the flesh and milk of which form their principal source of food. And according to Grenet this semi-civilized people are severely afflicted with tuberculosis.

NORTH AMERICAN INDIANS.

Previous to the time that Uncle Sam placed the Indians under his fatherly care, they were free from tuberculosis. But since they have so far advanced in civilization as to eat beef furnished to them by this government, tuberculosis has become very prevalent. According to some of the physicians who have been stationed at the various Indian reservations, tuberculosis causes as high as 50 per cent of the mortality of some tribes. The custom of dividing a carcass of beef among a large number of the Indians, and the fact that they eat any and all parts uncooked, either fresh or dried, will probably account for the prevalence of the disease, as a single carcass would, under these circumstances, serve to infect a large number of Indians. Some have attempted to account for this unusual per cent of infection by the filthy habits and unsanitary abodes of the Indians. But I am of the opinion that there are no reasons to believe that the Indians are filthier to-day than they have always been. Nor are the Indian wigwams any filthier or as close and unsanitary as are the igloos of their northern brothers, the Esquimaux, yet these latter people, in their natural haunts, are free from tuberculosis. The Esquimaux has his dogs and reindeers, but no tuberculosis, while the Indian has his dogs and beef, and is seriously afflicted with tuberculosis. On the other hand, it has been found that the Indian is no more susceptible to the disease than is the Esquimaux, for when the Esquimaux is brought in contact with the white man and his cow, he readily contracts the disease, as is shown by the prevalence of tuberculosis among these people who live in the Danish settlements of Greenland.

ST. MICHAEL'S ISLAND.

In St. Michael's Island we have a somewhat different condition.

Large numbers of cattle and sheep are kept on the island, but they belong to the landlords, who export most of the meat and milk products. The peasants, who take care of the stock and market the products toward payment of rent for the land, principally use the aas as a beast of burden and a milk producer for his own family, because this animal can be kept more economically. Notwithstanding the fact that the climate is not favorable for tuberculous people, the disease is very rarely seen among the peasants.

ICELAND.

A very similar condition exists in Iceland, yet the Icelanders are quite susceptible of the disease when they emigrate to Denmark, where meat and milk are staple articles of food.

SWITZERLAND.

In some of the cantons of Switzerland there are few cattle, goats being largely used instead, and tuberculosis is not common in man; while in other cantons there are more cattle and tuberculosis is more prevalent among the people.

ITALY.

In Italy, a country blessed with one of the balmiest climates of the globe, tuberculosis is very prevalent.

STEPPE OF RUSSIA.

The Cossacks who inhabit the steppes of Russia are free from tuberculosis. These peoples use the flesh and milk of the horse for food. They have large numbers of horses, but no cattle.

GREAT KABYLIA.

Tuberculosis is unknown among the semi-civilized tribes of Great Kabylia. These people have large flocks of sheep and goats, but no cattle.

SOUTH AMERICA.

Similar conditions are found in a majority of the South American countries. That is, they do not use much beef or milk, and they are comparatively free from tuberculosis.

THE UNITED STATES.

But let us come a little nearer home. A few years ago, when the red man followed the bison and the deer trails over our western prairies unmolested by the hand of civilization, Minnesota and Iowa were thought to be nature's sanitariums for consumptives. But to-day we find the white man in possession, and cattle-raising one of the principal industries of this comparatively thinly-settled country. And tuberculosis is quite prevalent among the people; while it is estimated that from $1\frac{1}{2}$ to 3 per cent of the cattle (and we know that as high as 75 per cent of some herds) are tubercular. Thus we find that as the country settles up and cattle-raising takes the place of the chase, nature's sanitarium moves to the west.

CHINA.

In China we find a peculiar condition relative to tuberculosis. The wealthier or ruling classes, who live in the best homes and are surrounded with the best sanitary conditions of the country, having plenty to subsist upon and using more or less of the food products of the cow, are frequently afflicted with tuberculosis. While the poorer classes who can scarcely eke out an existence, living in crowded quarters, and under conditions that are anything but good from a sanitary standpoint, subsisting almost wholly upon a vegetable diet, probably never having tasted meat other than rat soup, are free from tuberculosis.

INDIA.

A somewhat similar condition prevails in India; owing to religious beliefs these people are largely vegetarians.

Other and similar instances could be cited, but I trust that sufficient has been presented to substantiate the statement that among every people who use the food products of the domestic cow tuberculosis is more or less prevalent; while it is rarely if ever seen among those people who do not use such foods.

COMPARISON OF THE DISEASE.

In the main, the morbid lesions are very similar, if not identical, in man and cattle. Yet a brief comparison of the disease, as seen in the two species, reveals, among others, these apparent differences which may in reality, be differences of degree rather than of kind.

First.—The disease runs a more insidious course in cattle than in man.

Second.—The formation and escape of tubercular pus is much more limited in cattle than in man. This is probably due to the marked tendency in cattle towards a limitation of the morbid process by the formation of a dense, firm, fibrous, limiting membrane, surrounding such morbid processes.

Third.—The ulcerative condition so frequently met with in man is not so common in cattle.

Fourth.—Septicæmic conditions that so constantly accompany pulmonary tuberculosis in man are rarely seen in cattle, except in the very last stages of the disease.

Fifth.—The anæmia, rapid loss of flesh and strength, so constant in tuberculosis of man are not seen in cattle, except in the latter stages of extensive morbid lesions.

Sixth.—Tuberculin has very little, if any, deleterious effect on cattle, whereas it is supposed to have a marked influence on the germ, arousing an activity in latent conditions of the disease in man.

These differences, though slight as they may at first appear, indicate that the cow is the natural harbinger of this germ or, at least, that nature has endowed cattle with much stronger powers of resisting the invasion of the tubercular bacillus.

If the disease is wholly or even largely distributed by tubercular people, why is it that in China the disease is quite prevalent among the wealthier classes, who are surrounded with the better conditions of life, while it is very rarely found among the poorer classes, who live, to use the very expressive slang phrase, "any old way?" Why is the disease not transmitted from the wealthier to the poorer class? Would it not be reasonable to expect that after having once gained access to the haunts of those poorly clothed, illy housed and precariously fed people of the poorer class, that it would spread among them with more rapidity than it would among those whose surroundings are better in every way, and less favorable to the development of the disease except that the wealthier class use the food products of the cow?

If the disease had been but recently introduced into this country by a few persons having contracted it in some foreign country it would be easy to arrive at satisfactory conclusions. But such is not the case, for the conditions, as relates to the disease and the two classes, have not materially changed for many years.

The only logical deduction that I have, as yet, been able to derive from these facts is that the cow in this case at least is the principal factor in the spread of the disease. And what is true of this case should be equally true in others.

Perhaps others may be able to offer a more satisfactory explanation.

Again if the human tubercular patient is such an important factor in the transmission of the disease, why do not the permanent inhabitants of resorts for consumptives more readily contract the disease? Or why do not the tribes of Central Africa become infected from the coast tribes?

Would it not be reasonable to expect this process to go on until the disease would be as prevalent among the interior, as the coast tribes?

It would appear from these facts that there is very little tendency for the disease to spread among those peoples who do not use the food products of the cow.

One of the most common and perhaps the most fallacious arguments that is brought forward, in support of the theory of human transmission, is the theory that the seat of primary infection, or more properly speaking, the seat of the most frequent, extensive morbid lesions, is an indication of the method of infection; or in other words, that the seats of the morbid lesions point out the avenue through which the germs gained an entrance to the animal economy.

If we reason by analogy it is at once apparent that the theory is misleading. Take for illustration, smallpox, measles, mumps, Asiatic cholera, bubonic plague, yellow fever, etc. These are bacterial diseases that are transmitted or rather contracted by inhalation. Yet in none of them are the morbid lesions confined to the air passages or the lungs; in fact these organs are not affected except as a complication of the disease proper.

Again anthrax and black leg of cattle, and glanders of the solipedes, are usually contracted through the ingestion of contaminated foods or water; but the morbid lesions are not confined to the digestive tract; in fact it is the exception to find seats of the infection in these organs, especially in the latter disease.

The question naturally arises, why should this theory apply to the tubercular bacillus so much more forcibly than to other organisms of a similar nature? Nor do laboratory experiments substantiate this theory as fully as we might reasonably expect.

It should be borne in mind that in artificial inoculation the bacilli are usually introduced into the animal economy in very much larger numbers, at a time, than in natural infection.

It is beyond the limits of sound reasoning to suppose that if a large number of these germs are introduced at a given point that they will act as a foreign body, that will produce more or less irritation, thereby forming a favorable nidus for the development of the germs, and obstructing their entering the circulation. Whereas, in natural infection the germs are usually so few in number as to produce little or no irritation to a free surface; consequently they would be much more likely to gain an entrance to the circulatory systems. Therefore, we should expect a much greater per cent of development of morbid lesions at the point of entrance, in artificial, than in natural inoculation.

My experience in post mortem inspection leads me to believe that in cattle primary lesions of the lungs are comparatively rare. A careful necropsy will usually demonstrate that the primary focus or foci are in some of the lymph glands; and with these serving as extensive culture fields, from which the germs are carried to other parts of the animal economy, by continuity of the parts and by circulatory systems. This process of autoinfection, with probable reinfections from external sources, sooner or later results in extensive or generalized morbid lesions.

In swine the lymph glands, spleen and the osseous tissue seems to be the most frequent seats of primary foci.

It is evident from the above that the germ first enters one of the circulatory systems before finding a field suitable for its development.

If this be equally true in the human, as some post reports seem to indicate, it is very evident that the theory in question is erroneous.

In connection with this phase of the subject I will cite the history of a case as given to me recently by a prominent physician, who was called to treat what he had reason to believe was a case of chronic, or more properly speaking, periodic simple tonsillitis in a woman. Ordinary treatment for this affection was prescribed, and the throat lesions rapidly subsided without rupture on the free surface; but the patient developed constitutional disturbances which proved to be tubercular meningitis that ran a remarkably rapid course, death taking place on the forty-first day from date of calling the physician to attend the throat trouble.

This woman was of a tuberculous family, a brother having recently died of this disease.

Judging from the conditions that I have seen in cattle as above described, I am inclined to believe that this throat trouble was tubercular and that instead of the tubercular products escaping by an opening on a free surface as in previous attacks, it was absorbed with the results as above stated.

Again will the advocates of this theory please explain how it is that we have primary infection in the form of tubercular osteitis, arthritis and meningitis. If the germs do not enter the circulatory system how do they reach these deep seated tissues? And if the germs do enter the circulatory system in these instances, are they not just as likely to enter it in other instances? And if they do enter the blood channel at all, are they not as liable to be carried to the lungs as from them?

One more thought relative to the spread of this disease by inhalation. It has been demonstrated beyond question, by a number of the leading bacteriologists of the day, that sunlight and atmospheric exposure will destroy most of the pathogenic micro-organisms. This seems to be especially true of the tubercular bacillus; yet how often it is that physicians and others will write and talk about the dangers of contracting tuberculosis by inhaling the tubercular germs that are constantly floating in the air in connection with the dust, etc. While there is no question but what the tubercular bacillus may often be found in quite large numbers in the dust of buildings and especially rooms that have been, or are, occupied by phthisic patients, it is equally true that outdoor air is rarely contaminated with these germs.

If the air is so impregnated with these germs as some would lead us to believe, would it not be reasonable to expect that we would have more or less wound inoculations in the bovine species? for wounds in cattle are very rarely kept antiseptic. And if we should get inoculations from this source, and the theory is true that the tubercular bacillus always leaves his path of entrance to the animal economy strewn with morbid lesions, we would certainly have more or less cases of local manifestations of the disease in cattle, the same as is sometimes seen in the human, and fully 90 per cent of all adult cattle would thus become inoculated at some time. Yet, so far as I know there is not a single case of this kind on record.

No, gentlemen; when we talk about the constant spread of this disease through the inhalation of the germs in the outside air we are simply clinging to the relics of an old, pernicious, bygone theory.

Several theories have been advanced to explain how immobile bacilli gain an entrance to the animal economy, but my time will not permit me

to discuss this phase of the question further than to say that while none of them have as yet been fully substantiated, some recent experiments seem to indicate that germs adhering to oil globules, as in meat and milk, may be readily taken up by the lacteals. When this point shall have been settled it will undoubtedly clear up some mooted questions of to-day.

I am of the opinion that the tubercular bacillus usually enters either the blood of lymph systems, as do other germs, and is carried along until it reaches a field that presents favorable conditions for its development, provided it is not destroyed by natural forces before reaching such fields. The lymph glands, especially those of the splanchnic cavities, most frequently present favorable fields for the primary development, though this may differ somewhat with age, specie and the physical condition, not only of the animal economy, but with the various organs, as injuries of the osseous tissue, especially in the young, emboli and stenosis of the small blood vessels, etc. The air vesicles of the lungs, especially in man, may at times present favorable conditions, but these are the exceptions rather than the rule.

While it is quite generally agreed by the medical profession that there is more or less danger in the use of the food products of tuberculous animals, this phase of the question has never received the attention that its importance justly demands. There has been but little concerted action upon the part of the medical profession to prevent the spread of the disease through the use of the food products of tuberculous animals.

It appears as though a large per cent of the busy practitioners have, perhaps unintentionally, arrived at the conclusion that to control tuberculosis is beyond the power of man, and give the subject very little consideration, other than to prescribe such lines of treatment as promise the best results, entirely ignoring the fact that their patient is, perhaps, being daily reinfected through the use of contaminated foods.

It is evident from the almost unlimited lines of treatment that have been advocated that curative treatment has received much more attention than has been given to prophylactic treatment.

Perhaps you are asking what can be done to lessen the spread of the disease? In reply I would say that if the logical deductions of this paper were followed all that would be necessary would be to stamp out the disease in the bovine specie. But to assist in the good work, to hasten its full accomplishment, and to obviate all danger of a possible error in the views presented, I would suggest the adoption of such sanitary precautions as may be justly enforced relative to tuberculous people and animals; for every tubercular animal is, to a greater or less degree, a disseminator of the tubercular bacillus; and I would especially urge the prohibition of the traffic in and sale of the food products of tubercular animals, as may be accomplished by proper milk and meat inspection, as indicated in the following:

By the proper use of the tuberculin test and proper sanitary measures the dairy can be freed and kept free from tuberculosis; and an inspection properly carried out will prevent the sale of the flesh of diseased animals. But in order to accomplish this we must have laws enacted that will provide for such inspection, and furnish the money with which to carry on the work; and before this can be accomplished the general public must be edu-

cated to have a just appreciation of the dangers that constantly attend the use of all foods that may be contaminated with tubercular bacilli.

THE POSITION OF THE PHYSICIAN.


As physicians you have it within your power to wield an immense influence for good in this field. Good results will soon be manifest if each physician would recommend to his patrons the use of, and use in his own family, only such animal food products as have been properly inspected.

Each and every physician has more or less political influence which he should not fail to exert in behalf of wholesome legislation along these lines. This is a just proposition because the question of stamping out tuberculosis that is the enactment of laws and the appropriation of money to carry on the work, savors largely of politics.

If the medical profession of the State would make a united effort in behalf of the suppression of tuberculosis in the dairy cattle of the State, it would not be long ere we would have good laws and plenty of money with which to carry on the work.

In conclusion let me urge you to arouse from your lethargic state relative to this disease. Let all of us take an active part in stamping out this the greatest of all animal scourges, that we may feel that we have, in this instance at least, fulfilled our duty towards mankind.

[Though not a part of the foregoing paper, the following illustrations furnish an object lesson that forcefully emphasize the teachings of the paper. The cuts were kindly furnished me by Dr. J. N. Hurty, Indianapolis, Ind.,—the Secretary of the Indiana State Board of Health. A careful study of these plates will afford food for reflection that may result in better protection against the "great white plague."—SECRETARY.]

This cow appears to be healthy, yet the tuberculin test proved she had tuberculosis.  See next picture.

This picture was taken two years after the one above. Notice the effect of the disease. **Query**—How many people did her milk infect?

Tuberculous lung tissue from same cow. How long will we continue to commit suicide because it costs money to destroy infection?

Tuberculous liver from same cow. When do you think we will become practical enough to save our lives through the application of sanitary science? Sanitation costs a little money, but disease and death are a fearful cost.

XXIV.

THE RELATION BORNE BY VENTILATION AND OUT-DOOR LIFE TO THE PREVENTION, MANAGEMENT, AND CURE OF PULMONARY CONSUMPTION.*

My view is, that such a paper as this should be suggestive, not exhaustive. In other phrase, that it is intended to be simply an outline introduction, to the topic awaiting discussion. This theory is not exactly in accord with hygieolatry, but it is one that does not undervalue time, and it is not unmerciful to a congregation of essayists full of deliverances which wait on utterance. I am requested to speak on one phase of this anatomization of tuberculosis, that is to say, on the relation borne by "ventilation and outdoor life," to the prevention, management, and cure of pulmonary consumption. "The thing that has been, it is that which shall be; and that which is done, is that which shall be done; and there is no new thing under the sun," said an aforetime "preacher" whose wisdom was God-like and inspiring, and who held the "mirror up to nature" with an impartiality unexcelled by any other teacher "until Shiloh came" to construe, apply and enforce, those sermons of the olden time, breathing into them the Ruach-ha-kodesh—the breath of the Divine Spirit—"for the glory of God, that the Son of God might be glorified thereby."

The germ theory, itself, which holds the profession in duress again in these days, and which is being made to play so prominent a part in the discussion of pulmo-tuberculosis, is a theory *redivivus*. It has come down to us from the many sided Varro, who lived and studied, wrote and voluminously published in the century before Christ, and who, during the numerous military campaigns in Asia Minor in which he participated in middle life, was in position to have had access to the secrets of the Egyptian hierarchy, and might have got in that treasury of a wonderful civilization the hint on which, in his eighty-first year, in his book, *De Re Rustica*, he succinctly spake, thirty-six years before the Christian era. Down through historic Leuwenhoek, the keen-visioned Dutch physicist, the admitted father of modern microscopy, whose discoveries, made with glasses of his own improved construction, were seized upon, near 200 years ago by medical men in search of novelties, and were finally converted into a germ theory which dominated the crude medical schools of the time, fighting

* By E. A. Guilbert, A. M., M. D., LL. D., Dubuque. Read before the Conference of State and Provincial Boards of Health of North America, at Detroit, Mich., August 10, 1898.

valiant battles for its life for about fifty years, winning victories and sustaining defeats, but always "bobbing up serenely" again, quite in the line of modern events, until after a picturesque career of near fifty years, it was finally killed by Iconoclast Buffon.

So in the matter of "ventilation and outdoor life," now being considered in this notable symposium of thought and expression, no new deliverance can be tendered the skilled symposiasts now in this presence, forasmuch as they "know whereof they affirm," and whose aim is, when discussing hygienic questions, to do so from the standpoint of that pregnant motto, the motto of the Iowa State Board of Health—"The Health of the People is the Supreme Law." Briefly, then, the value of adequate room ventilation and a well regulated outdoor life, in the prevention, treatment and cure of pulmo-tuberculosis, cannot be overestimated. Those who for years have been in the habit of observing this insidious scourge, which frequently is born of "the mind diseased," as well as a persistent violation of the law of right living, and have invoked the aid of the good goddess of hygiene in the medical conduct of cases, have often seen cause to "thank God and take courage," because of the marked results the effective combination has secured, even in seeming unfavorable cases. There was more in the sanitary teachings of that best of barefooted friars, the late Father Kniepp, than is dreamed of in the philosophy of many. Since his passing they have not died, but live on to be unmoved by the thoughtful and judicial minds of this and kindred bodies, the good being preserved for the armamentarium of the profession, the false being relegated to

"A limbo large and broad,
The paradise of fools, to few unknown."

That is to say, to the mass of theory wreckage with which the shore of the sea of medicine is so thickly strewn. The mission of the latter day sanitarian has become one of conceded public moment. It has back of it "an exceeding great army" of intelligent lay-supporters. Despite the indiscriminating paternalism which the unwisdom of Sir oracles is attempting to foist upon it, the science has received the lionage of all thoughtful people and has achieved imperial powers under the law. Hence the humblest health official can now speak and be heard, and, best of all, when he speaks he will be heeded by all who are fit to live.

The day has gone by when physicians and well-informed laymen look complaisantly on the practice, which dies hard, of immunizing consumptives in close rooms, amid unsanitary surroundings, depriving them of God's sunlight and His blessed air, thus expecting to circumscribe the ravages of this scourge. Hence, have sprung up, the numerous health resorts of this decade, where the sick are introduced to hygienic apartments, to a carefully regulated outdoor life, including consistent chest and general athletics, not forgetting, either, that best of all passive exercises, horseback riding; where exercise is not directed by iron clad rules, but is adapted to the case in hand, not the case to it: where the medical director, the house treasury and the cook are in sweet accord, and taste and assimilability "sit at meat" in amity; where common sense directions of habits of life, clothing, care of the person, rest, sleep, room temperature, diet, and the form and quantity of daily physical exercise are made the subject of medical prescription; where, in fine, these most important adjuncts are in evidence, that is to

say, a site at the proper altitude, where undue and pestiferous humidity and sudden climatic changes are exceptions, not the rule; not forgetting that in this picture of an ideal asylum for consumptives, we find its arboreal surroundings to be composed of the various and aseptic conifera, whose

“ Boughs always are singing,
Old songs with new gladness,”
as they exhale
“ Balmy breath that dost almost persuade
Disease to break her sword.”

In sanatoria, thus enviroed and thus scientifically policed, have we not often seen it demonstrated that Ramage was not daft when about seventy-five years ago he wrote his book “Consumption Curable?” Yet Ramage’s work and its substantial results were done and secured in a London hospital for consumptives, which, though for that day well adapted to its purpose and admirably conducted, “was not of the fashion of these times;” to those workers “much has been given” and of whom “much will be required.” I know that these sanatoria are closed thoroughfares to the many. They are, in private hands especially—costly luxuries, which are only within reach of the rich, or of the fairly well-to-do. And I know likewise, that into “the short and simple annals of the poor” uncounted episodes of help have been made to enter by unobtrusive medical men, who knew their duty and did it well, unconscious sanitarians as they were and whose successors, in town and country, possessing added and varied information, often put to shame the tyrannies of putative health board magnates, who are long on theory but short on practice. Of course it is to be understood, that in all these matters relating to change of climate, choice of asylum and *cetera*, experienced medical men should be consulted, who would direct that a patient in an advanced stage of tuberculosis, be not suddenly transported from an altitude, for example, of a thousand feet above the sea, to the several hundred percent higher altitude of Colorado. But *per contra*, that he should be carried thither slowly, by successive stages, to the end that rarefaction and tolerance might have time to become correlated and the sick chest be not encumbered with its assistance.

One form of outdoor life which is of value, has, I think, in the clamor of the health resort business, been lost sight of latterly. I allude to “a life on the ocean wave” as it was lived in a New England fishing smack, not the pampered life on a fashionable ocean greyhound, with its “society” trivialities, its unwise gluttonies, and its petty extortions. I recall a remarkable case in point. Late in April, 1858, a gentleman of repute, who, for years, had led the life of a clerk in a Surveyor-General’s office, after some months of increasing invalidism, consulted a physician for a harassing, loose cough, considerable purulent expectoration, emaciation, night sweats and *cetera*. He was of medium height, narrow chested, and of not robust physique. The bodily machinery was evidently running down. The familiar picture of disease was ominous, a prognosis which physical examination of the chest confirmed. He was a most intelligent gentleman, not too intelligent, by the way, to listen to reason, hence he was an obedient patient, for he was a believer in, and an exemplifier of Franklin’s proverb—“God helps them who help themselves.” A few weeks of medical and physical treatment decidedly modified his trouble and reawakened his hope of living. An

entire change of life-methods and climate seemed to be indicated. Therefore, his physician prescribed a journey to the harbor of "the Blarney Stone of New England," directing him there, or thereabouts, to board a fishing smack and go on a cruise for cod. He cheerfully acquiesced and promptly departed. He was gone two months, sailing in a comfortable boat, with a congenial captain and crew, and he roughed it with the rest, never, however, forgetting his daily bath of sea water, his vocal gymnastics, and *cetera*. He returned to his western home so browned, erect and physically improved, that he was hardly recognizable. He has never, entirely, lost his cough, nor the evidences of cardiac hypertrophy, but he lives to-day, in fair health, and in the active discharge of the duties of the office of Secretary of the City Board of Education, an office he has filled with signal efficiency for thirty-eight years. He is not an exceptional illustration of the fact that consumption is not incurable in rural or civic private practice without quarantine attachments, as the experience of the profession attests.

So the conclusion of the whole matter is this: That house and personal cleanliness are "next to Godliness;" that damp dwellings are as pestilential as they are avoidable; that no house is fit for human beings, especially a consumptive, to live in, that is buried in foliage or is not open from its *atrium* to its *penetralia* to adequate sunlight by day and the air of Heaven by night; that fair ventilation is possible in even the humblest abodes, without subjecting the sick to menaceful drafts; that the consumptive, yet able to get around, should be taught the value, the limitations, and the *modus operandi* of legitimate athletics, seeing to it that

"Digestion waits on appetite,
(appetite on judicious exercise)
Health on all."

But, above all, we should remember that "an ounce of prevention is worth a pound of cure," and that the old Latin axiom—*Obsta principiis*—oppose the beginnings, is a golden rule which is founded on reason, whose other name is common sense, and should be followed out to its logical deductions as often as opportunity opens the way.

XXV.

THE HYGIENIC TREATMENT OF TUBERCULOSIS.*

As far back as the days of Moses a sanitary code was promulgated that to the Israelites had all the authority of a divine utterance. Many provisions in that code were fully abreast of the most advanced thought of the ablest sanitarians of to-day — as practical protective measures.

We find that in leprosy, for instance, not only lepers themselves were regarded as the means of extending the disease, but that their clothing, and their residences, if incapable of being successfully disinfected, were to be destroyed.

The fact was fully recognized that the walls, and even the foundations of the houses of lepers became so infected as to be sources of spreading the disease, and under specified conditions were regarded as incapable of disinfection, and ordered destroyed, and the debris removed beyond the city or camp.

About one year ago an intelligent gentleman, a merchant living in an Iowa town to which he had recently removed, purchased a residence property for a home for himself and family. After doing so he was informed of some facts that produced a great deal of anxiety, and he wrote to me as Secretary of the State Board of Health for advice. The facts as stated were that of three families who had previously lived in the house in succession, each family had lost one or more members with pulmonary consumption. Of the last family four members had died of this dread disease.

He wrote that the house was in every way desirable, and yet with such a history he hesitated, and justly, too, to move his family into it.

The mere fact of such an inquiry demonstrates that the laity as well as the profession is coming to look upon the "great white plague" as an infectious disease; and that its appearance in any individual is a result not so much of heredity as of infection and environment.

Consumption is essentially a house, or indoor, disease. Perhaps I ought not to say "essentially," and yet the expression is not far from the truth. I would not have you think that a residence in a comfortable, well-ventilated house is in itself a source of danger because of its liability to produce tuberculosis. The danger lies in the fact that the bacillus of tuberculosis which has become omnipresent finds more congenial and favorable conditions for its multiplication, duration of vitality, and for its destructive life processes in dwellings than out of doors.

*By J. F. Kennedy, A. M., M. D., Secretary of the Iowa State Board of Health.

There is much in the selection of a building site, so as at all times to secure good ventilation, plenty of sunshine and freedom from dampness. A house destitute of these hygienic conditions that has once become the abode of the tubercle bacillus is indeed a constant menace to its occupants — a menace that grows and strengthens with the increasing years.

The following interesting history of a house in Ohio was furnished Dr. C. O. Probst, of Columbus, the Secretary of the Ohio State Board of Health, by Dr. J. E. Gaston, of Mineral Ridge: "This house was constructed about 1830, and was occupied by a family of the name of F. It is related that a young man who lived with the family was 'always ailing and in delicate health,' but the only death was that of a baby with bowel trouble. They resided on the premises until about 1846, when the house was occupied by another family. They were an unusually strong and healthy family when they first came to the place, with no previous tubercular history. The first one connected with the family to pass away was a lady boarder, but information does not reveal the cause of her death. It was quickly followed, however, by the death of two sons, two daughters, father and mother, from tuberculosis, leaving only one son, who had previously gone to Illinois on account of his health, and who still survives. From 1879 until now the house has been held by the present occupants. There is no history whatever of consumption in the family prior to their coming to this house. The daughter who died recently was born there. Her death was the seventh in the family in as many years from pulmonary tuberculosis. A sister, two brothers and a mother survive, but the characteristic traces of the disease are plainly visible in the faces of one brother and the surviving sister. The building is a story and a half high and is surrounded by dense foliage." The doctor further says that the residents of this place look upon the house with horror, and if the family were to move out the building would go up in flames inside of twenty-four hours, and not a hand would be turned to save it.

The lesson I would teach from the foregoing is that when tuberculosis appears in successive families in the same house it is pertinent to inquire whether health authorities and citizens generally should not insist that it be, if possible, successfully disinfected, or else completely destroyed, for the public good.

The same inquiry, perhaps, would be pertinent in the case of some other infectious diseases. Only a few weeks ago I received a letter from Cumberland, Cass county, informing me of a severe outbreak of scarlet fever in a certain house. Some months before a party who resided in the house had in his family several cases of scarlet fever. Soon after he removed to Colorado—perhaps without the house being properly disinfected, if at all. Within ten days or two weeks after, another family had moved in and several members also came down with the disease in a malignant form.

The design of this paper is not only to emphasize the dangers of insanitary dwellings, but to magnify, if possible, the advantages of fresh air, outdoor life, chest expansion, and such athletic and other muscular exercises as will best secure and maintain the most perfect respiration; and this for the purpose of the treatment as well as of the prevention of tuberculosis.

I do not underrate nor minimize the great importance of disinfection, or destruction of the sputa and other excreta of consumptive patients, nor the

beneficial effects of proper therapeutic measures. These measures are highly essential and hence are heartily commended, as are also all efforts to secure milk and other articles of food that have no taint of tuberculosis.

Whatever undermines the general health increases the susceptibility to infection, and diminishes the power of recovery from incipient or advanced tuberculosis. The highest condition of health and resistful vitality is best promoted by the habitual breathing of pure air. I believe the greatest enemy to the bacillus tuberculosis is an abundance of oxygen, as found in pure, fresh air.

The open air treatment of consumptives and of those threatened with tuberculous disease, has, when systematically carried out, given better results than any other. In Germany, and to some extent in this country, the systematic treatment of those believed to be predisposed, and of those afflicted with tuberculosis in various stages, is resorted to in "sanitaria," with the most encouraging results. In these resorts the inmates have the advantage of a regular life, nutritious food, such exercise and chest distention as they can bear, and above all, an abundance of fresh air. Even in the coldest winter weather patients, after gradual habituation, pass the whole day walking in the open air, or sitting or lying on resting places comfortably wrapped in blankets. No claim is made for the advantage of climate—the all-important thing being an abundance of pure air.

Dr. Hambleton, of London, Eng., in his recent work on "The Suppression of Consumption," makes this bold proposition, and produces an array of evidence in support of it:

"Consumption is the direct result of the reduction of the breathing surface of the lungs below a certain point, in proportion to the remainder of the body, and is solely produced by conditions that tend to reduce the breathing capacity of the lungs." He says further: "I have experimentally produced consumption by these conditions. On one occasion I took a well-developed chest and gradually submitted it to conditions that tend to reduce the breathing capacity, and at the same time as far as possible, placed impediments to the performance of compensatory action by other organs. At first there was a reduction of the chest girth, a wasting of the muscles, a loss of the range of extension, the well-known change in shape, and increased frequency of breathing. This was soon associated with catarrh, pain in the chest, steady loss of weight, and hectic; and the process was continued until I was satisfied that consumption was well established. Then I induced compensatory action by other organs, and submitted the lungs to conditions that tended to develop them. This was followed by great relief in the chest symptoms, which evidently greatly disappeared, by a restoration of the general health, a return to the normal weight, and a change in the shape of the chest in the opposite direction, and I continued the process till the chest had regained its full development, and there was sound health. Each step in the experiment was carefully verified, the same sequence invariably observed, and I have both traced the presence of conditions, and watched their process in many cases of consumption."

Dr. Hambleton cites various occupations and conditions of life as illustrating his proposition—showing that the worst districts in England were not so productive of consumption as the conditions in the English army.

Notwithstanding these men were selected because of their physique, were examined before being listed, and re-examined in three months, yet an unusually large proportion became consumptive owing to the changed conditions of life, to the impure air of the barracks, and to the compression of the chest by clothing, and by a variety of conditions that tend to reduce the breathing capacity. He cites the fact that many animals that never in their wild and unrestrained conditions develop consumption, die from the disease within a few months or years after being confined—that strong, healthy women, accustomed to work in the fields, go to Paris, put on corsets, restrict their breathing capacity, and furnish the majority of consumptive subjects; that the children of consumptive parents, though born with as well-developed chests as those born of healthy parents, because of the care taken of them to prevent colds by exposure, and because of heavier clothing that interferes with breathing, early develop the disease; that from greater indoor life and greater chest compression the women of our country homes are more liable to consumption than the men.

He speaks of the easy facilities for travel existing to-day as conducive to consumption, and the reluctance of the people to walking if they can ride, and that by the invention of machinery so much is done now that formerly required muscular exertion. The construction of modern houses—the effort to make them impervious to outside air—creating a hypersensitiveness to cold, and preventing us from venturing out more than necessary during the cold winter months—also favors the production of the disease.

The preventive measures recommended by our author are erect carriage of the body; chest expansion by a systematic course of full inspirations; life outdoors as far as possible; the freshest and fullest ventilation of our homes; the discarding of all clothing or occupations that restrict chest expansion; the maintenance, so far as possible, of the highest and most perfect physical vigor by proper food, exercise, cleanliness, etc., having constantly in view, however, in all preventive measures the proposition so emphatically enunciated, “that consumption is the direct result of the reduction of the breathing surface of the lungs below a certain point, in proportion to the remainder of the body, and is solely produced by conditions that tend to reduce the breathing capacity.”

He concludes his monogram with fifteen propositions, the last of which is: “That both the experimental and the practical application of measures that tend to compensate for and counteract those conditions have been invariably followed by the arrest and subsequent complete recovery from consumption, where the disease was not too extensive; and the same process has obtained in the thousands of cases of cure by nature, and by Sydenham. * * * Consequently we now have it in our power to secure, with absolute certainty, the prevention of and recovery from consumption.”

Dr. Hambleton writes as an enthusiast—perhaps as a faddist—but he refers to more than a score of our most noted medical authors in support of one or more of his propositions. I firmly believe that the preventive and curative measures recommended by him conjointly with the methods of disinfection recommended by the advocates of the germ theory, afford methods of prevention that, if faithfully carried out, will materially reduce

the number of cases, and greatly lessen the fatalities of this dreaded "white plague."

Vital statistics furnished by the register general of Great Britain show that the deaths from this disease have, because of more intelligent preventive and curative methods, been declining in number the last ten years; and Dr. S. W. Abbott of Boston, secretary of the Massachusetts State Board of Health, makes the same observation as to Massachusetts. He attributed this falling off largely to the extensive use of the bicycle, especially by women.

In order that the best results from this treatment may be witnessed, it is important that the treatment should begin early. Indeed, the treatment should begin before the disease has really stamped its impress upon the subject, and be continued until the chest development and the general health are so improved as to render the subject immune, or until recovery is complete. Chest measurements should be taken and carefully noted, and where the lung capacity is below the normal, persistent and intelligent measures should be adopted and persevered in until the breathing capacity has been brought up to or beyond the normal.

Where practicable, treatment should be in hospitals or sanitariums, located and constructed with the most favorable sanitary conditions, and where the system of chest-development would be intelligently and persistently prosecuted. With a will and determination, however, to get well, no such appliances are essential. The patient at home can by his or her own individual efforts, under the direction of an intelligent physician, successfully combat the disease and regain and maintain excellent health.

I verily believe if the preventive measures above recommended are rigidly and faithfully observed for the next twenty years there will be a most surprising as well as gratifying falling off of cases of tuberculosis, and the methods of treatment recommended will commend themselves to the laity as well as to all schools of medical practice because of the large number of recoveries.

XXVI.

ANTHRAX.*

ITS CAUSE, NATURE, PREVENTION, ETC., FROM A BACTERIOLOGICAL STANDPOINT.

The first and best known instance of a disease definitely traced to the invasion of the animal body by vegetable parasites (bacteria) is anthrax, also called splenic apoplexy, charbon, or in the localized form, usually seen in man—malignant pustule. It is a disease occurring principally in cattle and sheep, but can be transmitted by inoculation to nearly all our domesticated animals.

In 1849, just fifty years ago, Pollender happened to examine the blood of a cow that had died from anthrax and discovered rod-like bodies among the blood cells. This discovery marks the dawn of pathological bacteriology. The same observation was made independently by Razer and Davaine in 1850 and by Brauell in 1857, but the greatest importance must be attached to the publication of Davaine's further researches in 1863. Many scientists at that period ridiculed the discovery of this bacillus, and stoutly maintained that they were only blood crystals or accidental structures in the blood of no clinical importance whatever. Davaine proved by a series of experiments the etiological significance of the presence of these little sticks, as they were called, in the blood of animals suffering from anthrax, showing that they were always present in the blood of affected animals, and that the disease could only be produced by inoculation with material containing them.

For many years very little progress was made, and the statements of other observers who were able to verify and add to Pollender's and Davaine's discoveries were still received with skepticism.

The further confirmation of Davaine's conclusion and the actual proof of the matter rested with Pasteur and Koch, who in 1877 communicated to the Academy of Sciences the important fact of sporulation observed in these bacilli by them, and further that they had cultivated them successfully outside the body, and then produced the disease by the inoculation of pure cultures.

*The copy and cuts were kindly furnished by the author, R. Alexander Archibald, V. S., editor of the *Journal of Veterinary Science*, published monthly at San Francisco, Cal.

BACILLUS ANTHRACIS.

X 1,000

A cover-glass preparation
taken from a bouillon culture.
(Archibald).

As seen in the blood of an affected animal, the bacillus anthracis consists of slender rods having a length of upwards of about three microns (a micron or micro-millimeter is equivalent to one thousandth part of a millimeter or to the one twenty-five thousandth part of an inch) and dividing into segments, when they exceed six microns. Owing to the fact that segmentation is not visible except on staining, we may notice in the fresh unstained specimen some few filaments apparently undivided, as long as twenty microns. Its width, as Huber has demonstrated, varies somewhat according to the species of animal in which it lives—about 1 to 1.3 micron. The bacilli are rod shaped, presenting ends which are square, or even slightly concave, as noticed when two segments adhere before separation, which shape characterizes this bacillus. It is aerobic non-motile, and possesses no flagella. Just so long as it grows in the bodies of living animals it assumes no other shape but the one described, and multiplies only by the method known as fission.

This is also true to some extent when grown in certain kinds of media, but when cultivated outside of the animal body or in the ordinary media used in laboratories, with one or two exceptions, the bacillus elongates into long chains or threads, in which spores appear, which are eventually set free by disintegration of the bacillary filament. These spores, when placed under favorable conditions for their development and are carefully watched, will be observed to increase in length a trifle, then undergo a rupture at one end, from which the new bacilli project, which then pass through the same vital cycle. The formation of spores is completed within about twenty-four hours at a temperature of about 35 degrees Cent. Cold retards the process as below 18 degrees Cent. sporification is no longer possible, and a temperature above 42 degrees to 44 degrees Cent. also inhibits their formation.

The bacillus anthracis itself is easily destroyed. Desiccation kills it in a few days. A temperature of 50 degrees Cent. suffices for its destruction in twenty minutes. The absence of oxygen is fatal to it in a short time, but

BACILLUS ANTHRACIS.**X 1,000**

A cover-glass preparation taken from a potato culture, showing spores. (Archibald.)



while the bacilli are so easily killed, the spores offer an extraordinary resistance to damaging influences. They withstand permanent desiccation, or even alternate moistening and drying, deprivation of oxygen, likewise any exposure to any temperature below boiling point, unless the exposure is very long. Time, and in fact ordinary conditions, seem to have no effect upon their germinating power. To be more exact, however, the spores of anthrax are killed by five minutes' exposure to a temperature of 100 degrees Cent., and are killed in five minutes in a 5 per cent solution of carbolic acid.

The above facts regarding the biology of this bacillus, mainly the work of Koch, establishes clearly how the disease spreads. Apart from the intentional inoculation the disease can be communicated by contact with any of the animal tissues, fluids or matter which contain the bacilli, or with wounds. As Davaine has demonstrated, the sting of wasps, flies and other insects can transfer the virus from one animal to another. Man is not infrequently injected by handling animal material, like hides or wool, etc., coming from diseased animals. In many cases such material is so old and dry that it contains no living bacilli, but only spores. It is indeed probable that the injection by means of the developed bacilli is a rare occurrence at the best on account of their destructibility. Where the diseased animal dies the discharge from the nose, mouth, bladder, rectum and wounds, all containing bacilli, impregnate the ground, and if the temperature is between 18 and 42 degrees Cent., these bacilli soon develop spores, which then remain in the field in an almost indestructible form, and are capable of infecting any animals grazing thereon. Pasteur, who must have overlooked the importance of the discharges deposited on the surface of the soil, attributed an important role to earth worms in transporting the spores from buried cadavers to the surface. But Koch has since shown that this ingenious hypothesis is unnecessary, if not impossible. For at the depth at which animal bodies are usually buried, viz: two to three feet below the surface, the temperature in most countries does not rise above

18 degrees Cent., and hence sporification would be impossible in the cadaver; furthermore, the want of oxygen would prevent the formation of spores at such a depth, and does indeed kill the developed bacilli within a short time. Hence, we need not look for the contagion below the surface of the earth.

Investigation has demonstrated that meteorological conditions and the nature of the soil exert an unmistakable influence on the prevalence of anthrax. Warmth and moisture favor its occurrence, while those farms and ranges which are most dreaded as "anthrax districts" are those which have an alkaline or calcareous subsoil, and are either marshy or subject to occasional inundations. In such localities the disease persists as a frequent epidemic. The explanation of these climatic and telluric influences is evident, since Koch has shown that the bacillus anthracis can vegetate outside the body of animals under conditions actually occurring in nature. According to the classifications of modern pathologists, the virus of this disease is both endogenous and exogenous. It can vegetate and multiply in the body of the victim, and can also grow and increase outside of it. The bacillus will readily develop in many vegetable infusions. Such nutritive fluids it finds in swamps and in pools of stagnant water, in which dead plants are macerating, especially when vegetable acids are neutralized by the alkaline constituents of the soil. As has already been stated, at any temperature above 18 degrees Cent., spores are formed, and when these almost indestructible seeds have once been distributed by floods or otherwise throughout a field, the germs of the disease cannot be removed again from the locality by any means yet known. The secret of the persistence of the disease is the fact that the bacillus anthracis is not limited to a parasitic mode of life in the animal body, but can vegetate on the proper refuse, even where no animals exist. It is a plant indigenous to the soil of certain localities, passing but occasionally and accidentally into the body of animals.

The disease can be transmitted to most animals commonly used for experimental purposes. Rodents are especially susceptible to it. Cats and dogs, on the other hand, often resist inoculation, especially when not too young. According to Toussaint, old dogs can be injected with certainty only by intravenous injection. Amongst sheep, commonly the readiest victims of this disease, Cheveau found a certain species imported from Algiers, possessing an almost perfect immunity against it.

In man the inoculation through a wound produces at first only a local symptom, the malignant pustule, from which he may recover without constitutional disease on excision of the pustule. Wool sorters' disease is anthrax of the lungs, due to the inhalation of spores with which the wool is infested. Birds are evidently not very liable to contract the disease or develop it on inoculation, though Oemler affirms that he has often succeeded in a variable percentage of chickens and other species. Pasteur, on the other hand, claims that under ordinary circumstances the fowl cannot be inoculated, for the high temperature of the body—42 degrees Cent.—is not favorable to the development of the parasite. But upon cooling the body of the fowl by immersing its legs in cold water, he could infect it successfully and could then let the disease run its fatal course, or could enable the chicken to recover by allowing it to regain its normal temperature in time.

Pasteur, however, does not communicate the details of his experiments, and does not even state how often he has made this observation. Koch denies the accuracy of these experiments, but has not disproven Pasteur's claims by any personal research.

Gibier, 1882, claims that charbon can also be communicated to frogs, at least in some instances, but only when these animals are kept at a temperature of 35 degrees to 37 degrees Cent.

The bacillus anthracis can enter the animal body through any channel except through the unbroken skin. As Buchner has shown, even the inhalation of dried spores is fatal, though ordinarily it is not the mode of entrance of the parasite. The natural infection occurs almost wholly from the intestinal tract, with the exception of occasional wounds and stings of insects.

Toussaint claims that the lymphatic glands in the infected region indicate the point of entrance of the virus by their swelling. By means of this guide he has traced the origin of natural anthrax to infection from the

BACILLUS ANTHRACIS.

X 500

A cover-glass preparation of blood taken from the spleen of a guinea pig. (Archibald.)

mouth in some twelve sheep and a couple of cows. Koch, however, in his latest work, 1882, disputes that the mouth is the usual starting point of the disease, but insists that in most instances the spores pass into the small intestines and there germinate in the alkaline contents, whereupon the bacilli penetrate through the intestinal wall. At any rate this is the mode of infection in the so-called intestinal mycosis of man, cases which cannot be diagnosed during life, but which the post-mortem proves to be genuine anthrax.

From the point of infection the bacilli pass to the nearest lymphatic glands, which by their swelling indicate the irritation caused by the growing parasites. It is only toward the end of the period of incubation that the bacilli enter the blood in any appreciable number, and it is only some hours before death that the blood contains a very large quantity of them. The parasites are evidently arrested in the capillaries of most of the viscera, especially the spleen, where they continue their growth until

they choke up these vessels completely. By appropriate staining Koch has shown that the "natural" injection by means of these bacilli demonstrates the topography of the capillaries and other structures more elegantly than any artificial injection.

Toussaint has watched the growth of the bacilli in the living momentum spread out under the microscope. Wherever an extravasation occurs the bacilli pass into the surrounding tissues. It is probably thus that they get into the secretions, which are all tinged with blood. In case of pregnant animals the placenta offers a barrier to the passage of the bacilli into the foetal blood, hence as Davaine and others have shown the foetus is as a rule not infected. But Strauss and Chamberlain have recently found that this is not invariably so, and that sometimes a few bacilli can be found in the foetal blood of guinea pigs.

It is not yet definitely settled in what manner the bacillus destroys the host's life. The dark color of the blood even during life has led Pasteur and others to suppose that the parasites, which we know to have a strong affinity for oxygen, abstracts this gas from the blood and thereby asphyxiates the animal in a slow manner. Yet this view has not been proven experimentally. At any rate the growth of so large a mass of parasites in the living blood vessels must injure the animal's organism, be it by the abstraction of oxygen or nourishment, by the embolism of so many capillaries or by the formation of bacterial products poisonous to the victim.

IMMUNITY.

Anthrax is usually a fatal disease, at least in cattle and sheep. But should one of these animals recover it is not liable to contract the disease a second time; the first attack gives immunity against a return of the disease. This immunity does not occur in all animal species. Loeffler quotes Demler in proof of the possibility of repeated attacks of malignant pustule in man. In his own experiments Loeffler found that rats, which are not very susceptible animals, can be inoculated a number of times with either slight or no effect at all and will succumb at some later occasion. According to Koch similar experiments, with mitigated virus, have since been made at the laboratory of the German Board of Health on rabbits, guinea pigs and mice, showing that these animals also cannot acquire a perfect immunity.

The immunity which cattle and sheep obtain by a first non-fatal attack of charbon suggested researches towards producing the disease in a modified form. Toussaint was the first experimenter to attempt this. He heated blood containing anthrax bacilli to 55 degrees Cent. for ten minutes or filtered it through several layers of filter paper, or added one per cent carbolic acid and claimed to reduce thereby its virulence, so that an injection of it gave rise only to a slight disturbance, followed by immunity against the disease. But a repetition of Toussaint's experiments by Loeffler proved them to be unreliable, if not fallacious, which is also the criticism of Pasteur. Pasteur soon afterwards (1882) devised a method by which the desired result could be accomplished. In the case of the chicken cholera parasite in producing a vaccine for it he reduced its virulence to chickens by prolonged exposure to the air without change of media. This procedure, however, could not be utilized in the case of the bacillus anthracis on account of the speedy transition of the latter into the state of dormant vitality, viz.: by the formation of spores. But sporification is prevented

by a temperature which, by itself, does not kill the bacilli. Kept permanently at a temperature of 42-43 degrees Cent. in neutralized chicken broth, this bacillus, according to Pasteur, does not produce spores. Under these circumstances the vitality is gradually lowered, and within a period of one month it dies. Inoculated into an animal during any time prior to its ultimate death, the bacillus will still cause anthrax, but with a severity proportionate to the vitality of the bacillus. The disease can thus be obtained in any desired degree of intensity. The feeble attack of anthrax from which the animal recovers, confers upon it an immunity somewhat proportionate to the severity of the experimental disease. The immunity granted, however, by a single attack of the milder type is not absolute. But it can be made so by a subsequent inoculation with a more active virus. Pasteur soon extended his experiments to entire flocks of animals and proved on a large scale that cattle and sheep, which have been vaccinated twice at intervals of twelve days with the attenuated virus can now resist successfully an inoculation with the most active anthrax material. He has cultivated the parasite in the above described manner on a large scale and puts into the market a "first vaccine" as the result of twenty-four days' attenuation, while the "second vaccine" is only enfeebled by cultivation of twelve days at a high temperature. Pasteur claimed that the power of reproduction of the enfeebled parasite is not materially lessened, nor are its appearances altered. Like the original bacillus it produces spores at a suitable temperature, but these spores and the fresh crop of bacilli developed from them have only the virulence of the enfeebled virus. Their power of struggling with the animal cells have been permanently diminished in proportion to the length of time, during which they had been cultivated under circumstances unfavorable to them. The inoculation is performed by injecting under the skin a small quantity of the chicken broth containing the mitigated bacilli. The disturbance which they produce in the animal is simply more or less a severe fever. These discoveries opened up an entirely new prospect in the management of infectious diseases, and their importance may yet be considered as simply fundamental.

Pasteur published numerous statistics of the wholesale employment of this protective vaccination. His most recent report refers to the results obtained in the Department d'Eure et Loire.

Altogether 79,392 sheep were vaccinated, amongst which number the loss by anthrax was reduced to 0.65 per cent in the course of a year.

In former years the loss had been 9.01 per cent, though the year in which the experiment was made was a very wet one, which would probably have given rise only to some 3 per cent of loss, as calculated on the basis of former experience. In those herds in which only a part of the animals were protected by vaccination, the loss amongst 1,659 unprotected sheep was only 3.9 per cent, while of 2,308 vaccinated animals but 0.4 per cent died of anthrax; 4,652 cattle had also been vaccinated, of which but 0.24 per cent succumbed to the disease; while former years had given a loss of 7.03 per cent.

Koch has raised some very serious objections against the practical application of Pasteur's researches. He does not underrate their great scientific value, but denies that they are complete enough for immediate practical utilization. He points out, first of all, that in other animals

except cattle and sheep even the severest non-fatal attacks of anthrax do not confer immunity. The attenuated virus which Pasteur puts upon the market for the vaccination of herds, Koch claims, *is not always of the proper strength*; sometimes it is so feeble as to fail in its purpose of protecting animals, while in other instances it was virulent enough to produce up to 10 or even 15 per cent of loss by the vaccination itself. In his repetition of Pasteur's experiments he found virus most suitable for the first vaccination of sheep which still killed mice upon inoculation, but failed to give anthrax to guinea pigs. The second vaccination is just severe enough to grant immunity against further inoculation, and not intense enough to destroy the sheep, if the bacilli are only enfeebled to such an extent as not to infect the rabbit, but can still vitiate and destroy the guinea pig. But the most fatal objection which Koch raises is the statement that the immunity produced by protective vaccination refers only to the inoculation through wounds and *not to the natural infection with anthrax through the intestinal canal*. If this be really so, and both the observations in France, at Kapuvár (Hungary),

FIG IV.
BACILLUS ANTHRACIS.

X 445

A section of a kidney taken from
a Guinea pig.—(Archibald.)

and at Packisch (Saxony), as well as Koch's experiments prove, that the immunity is at least not absolute, then the practical value of Pasteur's vaccination is as yet chimerical. Koch tested the immunity of eight sheep vaccinated twice according to Pasteur's directions by inoculating them with material from an animal just dead from anthrax. One of the victims died, the other seven resisted successfully and had thus passed through three vaccinations. Twelve days later they were fed with spores cultivated from the material used for the last inoculation, in consequence of which two succumbed to the infection. The natural mode of infection is, therefore, the most dangerous to the animal and cannot be absolutely prevented by preventive vaccination. That a difference does exist between infection from a wound and the entrance of the parasite through the alimentary canal is evident indeed from various experiments on cattle, animals most prone to the natural infection.

There is no doubt that the virulence of the bacillus anthracis, its power to struggle successfully with the animal cells, can be reduced in different

manners. Pasteur's assertion that it is the influence of the oxygen in his mode of cultivation which enfeebles its vitality is not supported by any proof. Koch attributes the attenuation rather to the high temperature, for the length of time necessary to deprive the bacillus of virulence, varies in inverse proportion to the temperature at which it is kept. Touissant's original claim that the anthrax virus could be reduced to vaccine by heating it to 55 degrees Cent., it is true, was not confirmed by the Berlin experimenters, but they made use only of rodents and not large animals such as sheep, which Touissant himself employed.

Chauveau, 1882, repeated the experiments on sheep, and finds them correct, if but both temperature and the time of exposure be taken into account. By enclosing the blood containing the bacilli in very thin closed glass pipettes and immersing them entirely in the water bath, he found that even 50 per cent sufficed to kill the bacilli if the exposure lasted twenty minutes. During this period its virulence diminished gradually, so that when inoculated it produces a modified form of anthrax of a severity inversely proportionate to the length of time it was heated. The disease modified by this mode of procedure was found to be equally efficient as a protection against subsequent attacks as that produced by Pasteur's method, at least as far as the experimental inoculation under the skin was concerned. The only difference between Pasteur's and Chauveau's observations is the fact that the bacilli heated to 50 degrees Cent. do not multiply as rapidly when subsequently kept at a suitable temperature as they did prior to this exposure. Their power of reproduction is enfeebled like their virulence, but in what manner this is brought about by the influence of heat has not yet been determined, and just so long as we remain ignorant of the nature of the attack and defense in the struggle between bacteria and animal tissues neither the above question nor query, as to the essence of the immunity against the return of the disease, can be answered.

The prevention of anthrax by means of protective inoculation has been attempted on a very large scale in France, and it is claimed that the results have been very beneficial to agricultural interests in that country, where it is claimed that the percentage of losses has been reduced from 10 per cent to .94 per cent in sheep, and from 5 per cent to .34 per cent in cattle. Cope, however, in a report to the board of agriculture in 1894, regards these conclusions as somewhat fallacious, because in order to prove that the animals inoculated received immunity, it should be shown that they were subsequently exposed to the risks of natural infection. This was not the case. But a report from the bureau in Paris gives the actual number of animals on each of the infected farms and the number which have died of the disease; and when compared with the statistics from which the above percentages referred to by Cope were computed, it is evident that nine-tenths were not on the farms where the disease usually appeared, and that the deaths from anthrax on these farms where it was reported to exist were, if anything, higher than they were supposed to be prior to the introduction of the system of vaccination; and in spite of the immense number of animals vaccinated the official returns obtained from Paris, by Cope, indicate that the mortality from anthrax, calculated in the ordinary way, remains as high as ever.

FIG. V.
BACILLUS ANTHRACIS.
X 245

—
A section of a spleen taken
from a guinea pig.—(Archibald.)

In Germany, veterinary and agricultural authorities agree that the results have not met with the success which has been claimed for vaccination in France. A number of experiments were instituted by the German government which led to the following conclusions:

- (1) That the first vaccine is mild and harmless.
- (2) That the second vaccine, even in the hands of the experts, is dangerous and often fatal.
- (3) That sheep are more affected than cattle by the injections, exhibiting fever and other indications of illness.
- (4) That cattle and sheep which recover from the vaccination have an immunity against anthrax when tested by experimental inoculation.
- (5) That vaccinated cattle and sheep tested by exposure to natural infection by grazing on infected pastures contract the disease in the ordinary way.
- (6) That the time for which immunity is conferred has not been determined.

Vaccination has been tried in England by Klien with the result that animals either succumbed to the vaccine, or to virulent anthrax after recovery from the vaccine. Protective inoculation has also been employed in a few instances by large stockowners in England, but with very unsatisfactory results.

Crookshank says that it is extremely doubtful whether an anthrax virus can be obtained which is absolutely incapable of creating centers of infection and can, therefore, be recommended with safety for vaccination as an auxiliary and voluntary measure.

There is no question regarding the theoretical efficacy of Pasteur's method of producing immunity from anthrax in cattle and sheep, yet it must be admitted that from a practical standpoint it is far from being what Pasteur claimed it to be, notwithstanding the statistics compiled by him.

The author has made many experiments with the vaccine, placed upon the market by the company bearing Pasteur's name, which he presumes is produced after the methods employed by the illustrious founder of said

company. A number of guinea pigs and rabbits were inoculated with quantities ranging from $\frac{1}{2}$ to 2cc. of both the first and second vaccine, with the result that the injection had no more effect on these animals than if so much distilled water had been used. A number of slides were made, stained and examined under the microscope from both vaccines without demonstrating the presence of a single bacillus. A number of tubes of bouillon and solid media were inoculated from samples of both the vaccines with negative results. These experiments have been repeated several times with the same results, demonstrating conclusively that the vaccine placed on the market by the Pasteur Vaccine company possesses not one beneficial property. Whether this is due to the use of improper methods in its production, or to the age of the vaccines, is difficult to determine, but it seems probable that had these vaccines been produced in a proper manner they would at least have retained some toxic properties, which was not the case, however, as an inoculation of 2cc. into young guinea pigs failed to produce any effect whatever.

Owing to the fact that there are large portions of the State of California infected with the bacillus anthracis, and the fact that the meteorological and telluric influences are very favorable for its existence and propagation, makes the subject matter of preventive vaccination one of more than passing interest to those who are identified with the livestock industry of the State. And it is daily becoming a matter of more and more interest to those who live in anthracoid districts and are becoming more familiar with the nature of the disease and who are anxious to obtain a reliable and efficient vaccine that will prevent the enormous losses which have been experienced of late years.

There can be no doubt that it is possible to produce a vaccine similar to that suggested by Pasteur, or at least a modification of it that will produce immunity, but the possibility of such a vaccine being produced in the East or in Europe, as a commercial venture, that will retain its properties and produce the effects for which it is intended is questionable to say the least. Any vaccine, toxin, antitoxin, etc., produced in large quantities for commercial purposes has a tendency to lessen the confidence of those who are interested in its use.

An anthrax vaccine to be effective must be produced with scrupulous care with regard to the temperature and length of time in which the original culture is attenuated. It must also be used within a reasonable time after its production and should have a definite standard of strength or virulency which can be demonstrated either at the laboratory where it is produced or upon the ground where it is to be used by the inoculation of a certain quantity into small animals, such as mice, guinea pigs or rabbits, in which it will produce effects that will stamp it as being of a stable character. Such a vaccine should be placed in the hands of experts employed by the State, county or municipalities, who alone should be authorized to use it.

To obtain a vaccine possessing the above qualities it must be produced by the government of the State in which it is to be used, and should be furnished gratis to those who are to be intrusted with its use, on condition that it is not to be used only in anthrax districts, for the reason that a vaccine of sufficient strength capable of conferring absolute immunity may

have the power of creating centers of infection in localities that were, prior to the use of the vaccine, known to be free from the disease and, therefore, uninfected. On the other hand, a vaccine that has been attenuated to such a degree that there is no possibility of it creating new centers of infection is, in our judgment, incapable of conferring absolute immunity.

FIG. VI.
BACILLUS ANTHRACIS

X 345

A section of a liver taken from a guinea pig.—(Archibald.)

In summing up the proposition of vaccination everything points to the fact that susceptible animals can be rendered immune to the ravages of anthrax, providing the vaccine be produced and used under the supervision of the state governments.

PREVENTIVE MEASURES.

The German authorities have reached the conclusion that the safest measures are destruction of carcasses and disinfection, and that inoculation with the vaccines at present attainable will have no effect in lessening the loss caused by the disease. Like all other communicable diseases, early recognition and prompt action are essential to prevent the spread of this disease. Unfortunately in the case of anthrax, usually the first indication of the existence of the disease is the sudden death of an apparently healthy animal. An immediate and careful examination should at once be made of the balance of the stock in that vicinity, and suspicious cases should be isolated from the balance. The owner or attendant may notice that some of the animals tend to keep away from the rest of the herd. They look dull and cease feeding, and possibly may be noticed to shiver, and in some cases there is a discharge of blood from the natural orifices. Death usually follows the appearance of these symptoms in a few hours, and often with startling suddenness. Cattle die rapidly, but sheep, though rapidly contracting the disease, do not, as a rule, die so suddenly.

One of the characteristic post mortem symptoms is the enlargement of the spleen, which is usually three or four times its natural size; it is not only enlarged, but extremely soft and dark in color. Blood spots are visible on the internal organs, and the intestines often contain a quantity of blood.

The examination of a drop of blood will show under the microscope the characteristic bacilli. It is not necessary in making a diagnosis to perform an elaborate autopsy in order to satisfy oneself as to whether the disease is anthrax or not. If an animal has died suddenly and has created a suspicion of anthrax, all that is necessary to do is to cut off an ear, or a foot, in the case of a sheep, and make cover-glass preparations at the first opportunity.

Stockmen with a case or cases of anthrax should be made to realize the enormous amount of poisonous material that has to be dealt with and destroyed, and the fact that an infected animal is more dangerous when dead than alive. Prompt measures must be taken to destroy the carcass and all traces of the blood, and thus to reduce to a minimum the chances of the disease spreading to the rest of the stock and creating fresh outbreaks in the future. Every possible precaution must be taken to prevent the dead animal from contaminating the pasture, corrals or water supply. The rest of the stock should be removed from the pasture or corral where the disease has broken out. It is a good plan to give a complete change of food and water with lots of exercise. The herd should be carefully examined daily for a couple of weeks, and any animal showing the least suspicious symptoms should be isolated from the balance.

To disinfect the pasture or corral, the best plan is to apply a heavy top-dressing of lime. After six weeks or two months stock may be readmitted, though not without some risk, however. If, as is often the case, anthrax occurs on a particular pasture year after year, the best plan is to keep stock from it altogether unless they have been properly vaccinated and convert the pasture into arable land. Even this is attended by some risk, as hay, grain, roots, etc., grown on infected land have been known to convey the disease; consequently, the wisest course to pursue, if the infected portions of the farms are small and can be located, is to put a fence around and plant them with trees.

Beyond doubt the surest way to render harmless all the bacilli which exist in the carcass is burning, but this method offers practical difficulties, especially if a large number of carcasses have to be destroyed. In the case of an animal dying in a city or town, the carcass should be taken to a crematory or bone yard and destroyed by exposure to a high temperature, care being taken that no blood, etc., be dropped on the highway during transit from the place of death to the place of cremation.

When the death takes place on a farm or range, the simple plan of burying, with the addition of lime, is perfectly safe and efficacious; and even without the lime if the carcass has not been opened, as the bacilli die rapidly if air is excluded. McFadyean carried out the following experiments, demonstrating the importance of having carcasses unopened and the efficacy of burying:

On July 16th, a sheep was infected with anthrax by feeding it with a virulent culture. Five days later it died, and a microscopic examination of blood from the ear, immediately after death, showed very many anthrax bacilli. The carcass was left unskinned and unopened until July 27th, when the various organs were cut out of the chest and abdomen and placed in a tin box. The box was then buried at a depth of about two feet in garden earth and left there undisturbed until February 15th, when it was

exhumed. The organs had become converted into adipocere, and this was thoroughly mixed with water and administered to a sheep. The sheep remained perfectly healthy. In another experiment a rabbit was inoculated with anthrax on June 1st. It died on June 3d and the blood from the ear contained the bacilli. The rabbit was left unopened for three days, and then placed in a flower pot and buried in garden earth at a depth of two feet. It was exhumed on February 15th. The tissues were all destroyed by putrefaction, and the earth in contact with the bones was administered to a sheep without conveying the disease or producing any ill effects. Thus, in the first experiment the lungs and the intestines, in which spore formation was most likely to occur, were used as a test, and in the second the entire carcass. In both cases there was destruction or disappearance of the bacilli, and these tests, therefore, confirm the opinion that prompt burial of the unopened carcass is a perfectly safe plan to adopt. If an animal has died in a pasture, a pit six feet deep should be dug close to the carcass and the carcass be buried with a layer of lime above and below it. If there are any traces of blood where the animal lay, the contaminated ground should be covered with lime or drenched with a strong solution of carbolic acid. If an animal dies near a stream or river, the carcass must be removed for burial to a sufficient distance to preclude any reasonable probability of contamination of the water.

Anthrax spores may be introduced or imported with wool, hides, grain, hay, manure, etc., so then it is almost impossible to prevent the importation of the disease; but the danger of its unlimited extension and disastrous losses can be minimized, and the communication of the disease to mankind, at least, can be entirely avoided by the adoption of a few simple precautions.

XXVII.

THE EVOLUTION OF SANITATION IN IOWA.*

The undersigned, representatives to this body from the Iowa State Board of Health, take pleasure in thus replying to the queries propounded in the Official Circular announcing the program of this thirteenth annual meeting.

First.—"What are the principal lines of work of your body?"

Our reply is: Organization, education, action.

Second.—"How is each accomplished?"

We answer not *seriatim*, but generally. When about eighteen years ago our State Board of Health began its march to honorable fame, as the statutory ruler of the health interests of the Commonwealth of Iowa, it saw that in this, as in all human or business endeavors, organization was the breath to the life of success. To that end it made it its special mission to establish numerous rallying points for the inchoate sanitary forces of the State, from which schools of instruction adequate information, illustrated on occasion, by graphic object lessons, could promptly be disseminated widely and effectively. The misinformation which prevailed among the people, professional as well as lay, was very dense and they were apathetic as well. The vast majority knew little of the science and the art of hygiene, and for it cared less. They looked upon a State Health Board as one of the nineteenth century fads, as a sinecural title factory, which the legislative fool-killer should have promptly knocked out; instead of endowing it with force and power and constituting it a co-ordinate branch of the State government. As yet, amateurs themselves, the members of the new Board were charged with the conduct of this endeavor, at a period when hygienic science was hardly out of its swaddling clothes, and methods of government were in the tentative stage.

The medical members, who control, had been selected by the Governor of the State, as provided by statute. The appointments, proved to be excellent ones. Two of the members were scholarly men—Robertson and Dickinson—who had a taste for hygienic studies, and had had experience as college teachers. The other five were educated physicians of assured position. All were competent to "learn" wisdom "by the things which they suffered," and the Lord knows that for years they suffered enough to at last have come to think of themselves "above that which is written" had they not been level-headed men. Few published

* Read before the "Conference of State and Provincial Boards of Health of North America," at Detroit, Mich., August 10, 1898, by Dr. E. A. Guilbert, member Iowa State Board of Health.

precedents were at hand, formulæ were fewer, and the literature of the science was not copious. The Board, besides, was confronted by an unsympathetic legislature, which was cynically observing this new illustration of the art of "making bricks without straw," an art which God's chosen people found somewhat difficult of accomplishment in the aforesaid time, as we are informed. It is no wonder, then, that some years should have elapsed before time, faith and energy—the three friends God has given the pioneer of reform—had enabled the Board to indicate its right to live, had conquered an honorable peace, and had prepared a goodly heritage to leave to its successors for the behoof of the people.

The writer has often thought that the makers of the Iowa Health Board methods, before they laid down their well worn "working tools," must have been fully in sympathy with that master of statecraft, the historic Diocletian. He resigned the purple, it will be remembered, because he was oppugnant, at heart, to a persecution of the Christians, which, against his better judgment, Galerius had induced him to decree. Regretting not the throne, to which he had given new lustre, he gladly retired to his country place and devoted himself to horticulture, of which he was passionately fond. It is related by him that once he was asked if, amid his then monotonous farm surroundings, he sometimes did not wish to resume the pomp and power of which he had for years been the central figure. Diocletian replied: "I have been a ruler of men and a planter of cabbages; of the two, I am more content to plant cabbages."

The founders of Iowa Health Board methods were men of affairs as well as prospective sanitarians. They knew very well that the unit of government in this nation was in the township organization. They recognized the potentiality of that unit. They deduced from such premises the inspirational idea that so likewise the unit or effective State sanitary organization was in the township. They began the work early; they prosecuted it against odds, sternly and hopefully, but always diplomatically. Meanwhile they gave due heed to the maxim—*Doce ut discas*—and they taught that they might learn. A few labor-filled years went by, and they had succeeded in organizing a health board in each township and city in Iowa, each one based on an adequate, organic law enacted by the board, and common to all; each supreme, under the law, in its own sphere, yet loyally acknowledging allegiance to its creator State Board, its methods, its members and its considerate decrees. By means of these prehensile tentacles, the present Board came into touch with the whole people.

No organization could be more complete, or as effective. In every hamlet its influence is felt, and it is "a very present help in time of" epidemic "trouble;" when for example, local disputes concerning diagnosis or hygienic methods arise; or when a sudden pestilence with puzzling phases and mooted origin—like the famous Sabula epidemic, for instance—appears, to play the deuce with sentimental medical ethics, and to terrorize communities. In quiet times the Board, like a good general, leaves its lieutenants in towns and cities, wholly in control of their own affairs, under stringent law, holding them responsible for the results. When necessity calls to action, as it often does, such action is prompt and decisive. During the years of its adolescence, it was the policy of the Board that the campaigns of organization and education should march shoulder to shoulder. Accordingly,

hortatory essays, leaflets and circulars concerning the hygiene of dwelling and municipality, personal and general, followed each other in due succession, and the subordinate local boards were charged with the duty of studying and disseminating them. And so the whole State resounded with hygienic clamor. Far-seeing editors, after a time, rose to the occasion and the press became a somewhat efficient propagator of sanitary information. Gradually the question of sanitary science grew to be a paramount, instead of a sentimental, one in the medical societies and colleges of the commonwealth, and there the cause achieved new distinction. At the end of six or eight years of this persistent work it became apparent to the public that the founders aforesaid had "builted better than they knew;" that the stamping out of epidemics had been reduced to almost an exact science; that to what the Board had "planted" and education "watered," God had given substantial "increase" in the way of a marked reduction in the general death rate, per consequence of a visible diminution in the sum total of cases of preventable and noxious diseases, and that a wonderful improvement in methods of municipal and home sanitation had come to stay, to brighten and to grow, and that stability and permanence were the distinguishing features of the superstructure that they had been deputed to erect. During all these years' organization, education and action, the Board has been fortunate in its secretaries, of whom, since 1880, there have been but three, to-wit: the untiring Andrews, the lamented Farquarson, and since May, 1885, the genial and accomplished Kennedy.

In the year 1887, a new and effective helper appeared in the form of that now well-known sanitary monthly, the *Iowa Health Bulletin*. Six thousand copies of the journal are issued and distributed every month "without money and without price." They are mailed to all the local boards, to interested physicians and to numerous laymen. Many copies of the paper, full of information, entertainingly put, find readers in other states. They have popularized the name of Secretary Kennedy, who has been its editor since it was born. Its literary excellence is conceded and is all the more varied because its editorial writers are not expected to say Shibboleth exactly alike. The exceptionally thorough organization of the State, the wide diffusion of hygienic information and the general satisfactory condition of Health Board affairs in Iowa, are present sources of pride to all who have been active laborers in this particular vineyard. Yet we are surprised when we review the past at the magnitude of present results, which have been achieved in spite of meagre monetary resources.

Unlike some other commonwealths, notably unlike the one the quarter-centennial of whose noble Board of Health we have just assisted in commemorating, our State has not been generous to its Health Board. A large minority of our State Legislature has always been with us, under the lead of a goodly number of medical men, biennially found there, as valuable members. That minority has invariably been attent to our frank contention, that income and "the vocation wherewith we are called" could, with benefit to the cause, be made more nearly conformable. But, too often, the majority has been unpropitious, and so we have done what we could, patiently biding our time.

Prominent among the instances of the fealty of our State Board to its doctrine of organization, education and action, we may mention two which have now national significance. Early in the present decade the Board was almost the first, if not the very first, to see that the question of the transportation of corpses, especially of the dead from infectious diseases, was one of vast and immediate importance. Prompt consideration was given the question and its various phases. Intelligent railway managers and educated funeral directors were consulted. After a few months incubation rules were adopted, which were at once put in force by railroad managers in Iowa. These regulations proved to be so timely and good that they became a nucleus of more elaborate regulations, which this conference received from the notable Cleveland convention of June 9, 1897, and favorably considered at Nashville last year, recommending them for adoption to their principals, the various State Boards. They were duly examined by our State Board, and cordially adopted. In the absence of appropriate legislation, which we failed to secure, the Board, acting under the ruling of the astute Attorney-General of Iowa, Hon. Milton Remley, exercised its lawful police powers and brought organization and action into at-one-ment on this contention, at the annual meeting in May last. The office of Licensed Embalmer was created. Proper regulations concerning the office, its duties and its limitations were enacted. These were heartily approved by the representatives of the State Funeral Directors' Association, at the head of which was the distinguished Hohenschuh. Under these rules some sixty-four applicants for the embalmer's license submitted themselves to a very rigid written examination, at our headquarters in Des Moines, July 26th, and the movement is on. Another is the action of our State Board on the fashionable question of how to circumscribe, treat, and prevent tuberculosis, human and bovine. As to the former: This has for several years been a subject of discussion in our meetings. As usual the Board has taken the public into its confidence, and has, by means of leaflets and the *Bulletin*, communicated needed information on the topic to the people. A more elaborate circular, for popular diffusion, is now in press and will soon be distributed. As to the bovine form: That matter is largely under the control of the State Veterinary department, at the head of which is an expert, an enlightened gentleman, who is also, *ex-officio*, a member of the State Board of Health. The two departments of the State government are in close touch, and the Board has always been ready to supplement Dr. Gibson's action by forcible word and considerate official deeds.

Another thing we ought to mention: From its inception the policy of the Board, within the circle of its influence, has been in the direction of the elimination of the idea that, in sanitary matters, at least, the broadest tolerance should not be cultivated, and that no one school in medicine should be preferred to another. The Board—as a health Board—cares nothing for pathies, as pathies. In its opinion, sanitary science is wholly sectless. It holds that “a man's a man for a' that.” It realizes the force and aptness of Paul the Apostle's axiom, which is the golden text of the Gospel of Toleration and Unity: “There are, it may be, so many kinds of voices in the world, and none of them is without signification.”

It never engages in, neither does it countenance, within the lines of its duty, profitless discussions of medical creed titles, which always end where they began. Life is too short and too real for sensible men, nowadays, to waste brain gray matter on such tomfoolery. Besides, we hold in reverence the wholesome doctrine, *noblesse oblige*, and to it we conform. This total effacement of sectarian lines in non-partisan boards, like our own, has been an educational object lesson to the profession at large and has done very much to lessen spoken and printed asperities in states where non-partisan boards exist under enlightened legislation. So it is rarer now than it was fifteen years ago to see controversial medical asses, who certainly were bores instead of gentlemen before they were born by the breech into the profession; cavorting around with defiant chips on their shoulders; "biting their thumbs" at those with whom they differ and bravely flinging stink-pots at all and singular who decline, at their bidding, to look at facts and things, and brother man through the reversed end of the telescope. In concluding: We are instructed to assure our confreres of the State and Provincial Boards here assembled, that Iowa yields to none in her desires that the *entente cordiale*, which has long subsisted between it and its honored sisters may long continue. She recognizes in them valuable helpers and experienced teachers, whose labors, on behalf of the race, she applauds and has sought to emulate, for they have been abundant and far-reaching, and valuable beyond computation. In the give and take of friendly offices, and in the chivalrous rivalry "to see who best can work and best agree," Iowa has been no laggard. She is not built that way. To this conference of sister State Boards of Health, so long as it holds itself aloof from entangling alliances and remains *sui generis*, we shall annually come with our fraternal representatives, bearing the gift of confidence and good will and honorable rivalry; asking nothing in return except a pledge that this body shall remain true to the traditions under which it was formed and "hold the faith in the unity of spirit," that faith which is outlined in the axiom which should be, but unfortunately is not, obeyed by all associations—"In certain things, Unity; in doubtful things, Liberty; in all things, Charity."

GUILBERT,
MCKLVEEN,
MATTHEY.

XXVIII.

CHILDREN'S EYESIGHT; AND SCHOOL DESKS.*

There are two things to recognize at the beginning of school life; a child's eyes may be so structurally defective as to make study unsafe, and yet the function of the eye may not be materially involved, that is, sight may not be apparently defective. Eye disease in infancy may have left incurable defects, not gross enough to be detected (except by careful and trained examination) nor greatly destructive of vision. Yet this defect precludes the safe prosecution of work arranged for healthy eyes. Normal vision is pre-assumed by those who lay out the work of all schools except the school for the blind. To insure against damage to children's eyes during school life it is necessary to ascertain their condition either before or as soon as possible after the entrance of the little ones upon school duties.

EYE-HYGIENE.

It cannot, I think, be successfully contended that school boards should employ oculists to examine the eyes of all public school children, but they can and should provide means whereby early in school life inquiry may be made along the lines indicated, comparing each child's vision with the normal standard, and leading to the discovery of symptoms of eye malformation. Record should be made yearly, and any deterioration should be reported to parents.

In this connection a short account of the work done in the public schools of Baltimore under the guidance of my friend, Dr. Herbert Harlan, and myself seems pertinent.

In the session of 1895-96, 53,069 children were examined; 43 per cent had normal vision in each eye, while 17 per cent fell below the prescribed standard. In the last session there were examined 39,241 children; 16 per cent fell below the standard, while 52½ had normal vision in each eye. It is to be observed that the plan discovers only children with defective sight. Between these and those with normal vision in both eyes there were left the first year 40 and the last year 31½ per cent of all examined. Many of these were discovered through complaints of pain in studying and through the observation of teachers, who became quick to detect evidence of defective eyes when their attention had been once directed to the matter. Some cases, doubtless, escaped recognition. They will be discovered when vision has become impaired, either functionally or through organic injury

*From "Health Magazine," February, 1898, by permission of the author, Dr. Hiram Woods, Jr., and the publishers who kindly furnished the copy and cuts.

to the eyes. An objective examination by one qualified to make it is the only way of reaching these cases. The point to which special attention is directed, however, is the case with which one-third of the children with defective eyes were discovered and put in the way of relief. This is the important part of eye-hygiene in connection with school life.

NEARSIGHTEDNESS A DISEASED CONDITION.

It may be asked, what is the nature of the damage done to the eye in school life, and why does it occur at this period? Complete answer would carry me beyond the proper scope of this paper. Briefly, damage is in the direction of producing nearsightedness, and produced nearsightedness is a diseased condition. It is a constant source of danger, and not infrequently after it has ceased to advance the eye remains weakened and liable to destructive disease. Elongation of the eyeball is the change leading to nearsightedness. The outer coat does not obtain its full power of resistance until about the twelfth year, or even later. Near work increases pressure within and upon the sides of the eye-globe, and certain refraction errors, notably astigmatism, demand increase of this pressure to give the child its best vision. Thus the danger of elongation is increased and hence the importance of early examination.

IGNORANCE AND POVERTY FROM IMPAIRED SIGHT.

A modified curriculum is needed for such children as have impaired sight, but who see too well to bar them from obtaining an education. Most of them suffer from the negligence or ignorance of those in charge during the first few days of life. Again, the effects of poor food, life under wretched hygienic conditions, inherited disease, etc., not infrequently cause incurable eye defects. These children are not able to go on with the usual course. Our statistics show that they gradually drop out. What becomes of them? Many of them live in poverty and grow up in ignorance. A question of more than ordinary importance is suggested by this class, which is not small in number. The records of any large eye hospital will furnish a small army of such children from one class of diseases—those of the cornea. Congenital lens-clouding—not operable—and myopia, with diminished acuity of vision, add many more. Subjects of everyday use should be taught these children. They should have books with large, clear type. At present, unless they belong to the well-to-do class, there is nothing open to them between the public school course and growing up in ignorance.

THE DESK PROBLEM.

A special need is reform in the seating of children; certainly in our public and, I believe, to no less extent in the private, schools. There are three points of importance to consider: first, the height of seat from floor; second, the distance of desk from seat, and, third, height of desk. The following quotation from an article by Dr. Risley expresses clearly the means by which these relations can be correctly maintained: "The arrangement of seat and desk must be such that the child will find it easier to sit upright at his work than in any other position he can assume in the seat. To secure this the seat must be of such a height as to permit the soles of the feet to rest upon the floor. The measured distance will be the same as that from the sole to the inner bend of the knee. The seat must be as wide as

the thigh is long, measured from the inner bend of the knee to the back, and should be slightly concave to prevent sliding forward, but should not be inclined either backward or forward, i. e., it should be level. The front edge of the seat should be placed from one to two and one-half inches under the inner edge of the desk. This is known as the minus distance."

RELATIONS OF SEAT AND DESK.

This latter term applies to the horizontal distance between the front edge of the seat and the rear edge of the desk. Seat and desk may have three possible relations. The seat may extend under the desk—minus distance; the front edge of the seat may be in the same vertical line with the rear edge of the desk—nil distance, or there may be space between the seat and edge of desk—plus distance. Nor is it a matter of indifference or convenience which of these relations is obtained. The "plus" distance is to be avoided. Dr. Risley thus describes its dangers: "To work at a desk so placed the pupil is compelled to reach forward. To do this he perches himself on the front of the seat, while the feet are carried backward under it. The trunk falls forward and finds support upon the elbows, one or both of which rest upon the desk. If but one, the left is used for support, while the right is employed, as in writing, the vertebral column is partially turned on its long axis and the entire trunk held in a distorted position, which we may well believe is conducive to the production of spinal curvature in growing children. In this forward pose of the trunk the head is no longer supported by the spine, and must, therefore, be upheld by the muscles of the neck, which should be required only to balance the head. They soon tire, and the work then falls upon the muscles of the back, which in turn give up the task and the head falls forward toward the work, while the trunk sags forward and downward between the shoulders, which are upheld by the arms, the elbows being supported by the desk. The face is brought too near the page and the left eye nearer than the right. The normal relation between the plane of the face and the work is thus disturbed, which, together with the abnormal near point, adds greatly to the strain upon accommodation and convergence." Of no less importance than avoidance of this plus distance of the seat is the height of the desk. If too high there is the same abnormal nearness of the face to the work, with consequent strain on accommodation and convergence; on the former, to enable the child to see the print; the latter to keep the eyes fixed upon the work. At the same time the arm in writing is thrown too high, with consequent distortion of the back and unnatural position of the body.

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MEASURING BOOKS AND MAPS (Chandler Desk).

NEW ADJUSTABLE SEAT AND DESK (Beveled Front).

SOME MISFITS.

There is, of course, recognition of the fact that small and large children cannot be comfortably accommodated in the same desk. In our public schools there are three sizes used. Their seat and desk measurements from the floor are:

	Height of seat from floor— Inches.	Height of desk from floor— Inches.
No. 1	17.50	28.75
No. 2	15.25	25.00
No. 3	13.50	22.00

These desks are arranged upon average measurements taken from a number of children of about the same age and in the same grade. That children of nearly the same age differ in height is a matter of common observation. Last winter, in preparing a communication to the School Board upon the need of reform in seating children in the schools, I obtained from Dr. Mary Sherwood some figures from her measurements of the girls at Bryn Mawr School. The impossibility of fitting with accuracy many sizes of children in three sizes of desks was what I hoped to demonstrate.

Dr. Sherwood's measurements form a convenient and reliable standard by which to study the desks now in the public schools. No. 1 has seat height $17\frac{1}{4}$ inches, desk $28\frac{1}{4}$. A very small number of Dr. Sherwood's measurements show a knee height of over 17 inches. Again, the highest desk required by these children needing a seat as high as 17 inches was 27.7 inches, the lowest $25\frac{1}{4}$. If these children had been given seats of the proper height the desk would have been one inch too high for the nearest fit and three and one-quarter inches too high for the farthest. Too great height of desk is a common fault. The book is brought too near the eyes, with corresponding increase in eye work.

No. 2 desks have seats $15\frac{1}{4}$, desks 25 inches. Here is a difference from No. 1 in seat height of two and one-quarter inches. Dr. Sherwood's figures show a large number of children with knee height between $15\frac{1}{4}$ and 17 inches. Seats in No. 1 are too high, seats in No. 2 are too low for these children.

Of 29 children with knee measurements of from 15 to 17 inches, 14 needed desks of a height of from 25 to 27 inches, 15 from 22 to 25. Here is a difference of 2 inches in a seat and 5 in desk requirements. The ages of these girls were from 10 to 17. A study of figures giving knee measurements between $13\frac{1}{4}$ and 15 inches, with the desk height needed, show the same irregularities.

It may be urged that interchange of seats and desks in three sizes will correct these discrepancies. It must be remembered that the part of the desk holding the books, papers, etc., will greatly interfere with such exchange.

SEAT AND DESK SHOULD BE ADJUSTABLE.

A desk which can be made to fit the child seems then a necessity, if the laws of health are to be observed. Strain on accommodation and convergence means increased ocular pressure and constant nerve irritation; hence it is not hard to see that errors of refraction, not apt to cause trouble under healthy conditions, may become manifest and annoying under such as have been described, and that the good effects of most careful correction of such errors may be lessened. To arrange it so that "the child may find it easier to sit upright" than to assume any other position is not only a scientific theory, it is a duty upon which too much insistence cannot be laid. There are several "adjustable desks," the principle of all being that both seat and desk can be adjusted to any required height and kept so.

RULES FOR MEASUREMENT.

The desk height is gotten practically by measuring from seat to elbow and adding three-fourths of an inch. The object is to insure a distance of thirteen or fourteen inches from the top of desk to face, the child sitting in the upright position. In most respects the "Chandler" desk is satisfactory. Dr. Sherwood, who has had large experience and has given careful study to the whole subject, has found one practical difficulty, which sometimes prevents this desk being "adjustable." In the case of children with either excessive knee height or unusually short distance between the knee and elbow, either the seat is so high, or the desk so low, that there is not room for the child's thighs. She has kindly given me her measurements which illustrate this.

Adjusted to Fit the Scholar.

The depth of the desk was six and one-half inches. After adjusting the seat and desk to measurements taken there were among eleven children a maximum space for the thighs 3.15 inches, and a minimum of 1.25 inches. If the seat is to be placed at the minus distance, as already insisted upon, the thighs must come under the desk. Thus, some children would be snugly and comfortably fitted, while to others it would be impossible to adjust the desk at all. Dr. Sherwood's measurements bring out this phase of the subject quite clearly. She sends this table,* and adds: "The last column is found by subtracting six and one-half inches, the depth of box, from space between seat and top of desk, and demonstrates the impossibility of properly adjusting the old desk in many cases." To meet this defect in the old adjustable desk, Dr. Sherwood has devised an interesting and ingenious modification, illustrations of which are appended. The adjustable attachments are the same as those of the Chandler desk. As is seen in the illustrations, the modification consists essentially in "the end panels being formed at their front edges with bevels or inclines," a similarly "beveled or inclined panel portion extending across the front portion of the desk body below the front edge of the incline top." The interior of the desk,

which for the purposes of this paper it is unnecessary to illustrate, affords ample room for books, pens, paper, etc. The desk seems to me to meet the difficulty for which it was devised. The slope of the top is 5° from the horizontal.

•DR. SHERWOOD'S TABLE.

CHILD.	Height of seat from floor— inches.	Desk from floor —inches.	Desk from seat —inches.	Space left for thighs with desk top 6½ in. deep—inches.
1	14.2	21.95	7.75	1.25
2	14.8	23.15	8.35	1.85
3	15.4	24.05	8.65	2.15
4	14.2	22.45	8.25	1.75
5	15.3	24.05	8.75	2.25
6	14	22.85	8.85	2.35
7	14.7	22.95	8.25	1.75
8	15.8	24.55	9.25	2.75
9	15	22.95	8.95	2.45
10	14.9	22.65	7.75	1.25
11	14.4	24.05	9.65	3.15

XXIX.

THE MONEY VALUE OF HEALTH.*

The wealth of any community has direct relation to the wealth of its component elements. As individual wealth is, in some sense, dependent upon individual productiveness, ability to produce is a necessary prerequisite. If the wants of a community could be met by its own resources, no importations being needed, the problem might be greatly simplified. But such, in a civilized state of society, can never be the case. Singularly enough, the larger a community the nearer the conditions can be brought into those of simple exchange or barter, from the diversity of occupations, resulting in a diversity of production. The common wants being clothing, food and shelter, it is idle to hope to find all the machinery for production of these essentials in a small community, or even in larger ones. Small ones can produce food, but must look to large centers of activity for clothing and much building material. Large cities, on the other hand, can furnish material for building and clothing, but must depend upon rural communities for food. It is apparent that society can never exist on any system of purely barter or exchange of commodities. Another patent fact is that there must be diversity of productive occupation, and some standard of value for the work done. All the above is truism, of course, but needs mention as a proper premise.

In determining what proportion of the individual's earnings goes to make up the public wealth, many considerations arise. From one point of view the total earnings may be considered a portion of public wealth, even the surplus, over and above cost of living, must enter into the sum total. Again, the cost of living, as a circulation of money might be considered the individual contribution, the surplus not being in circulation. But the surplus, by earning interest, either as loans or as bank capital, has a value to the community. From another point of view, the production of the individual must stand as his contribution to the public wealth; that is, its value after deducting the cost of the same. In other words, what the individual earns over and above the cost of living and manufacture will represent his community value.

It will readily be seen from the above, that different standards must obtain for differing purposes. For the purpose in hand, the productiveness of any individual being proportionate to his ability to produce, when sickness or accident intervenes, this power is lost, for the time being, and the relation of the individual to society is radically changed. Now for our

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present purpose it can be assumed that each man's contribution to public wealth, is what it costs him to live; what he spends in money. The poorer the individual, therefore, the larger the relative or proportionate contribution, nearly all the income going to his support, and that of his family. In the case of the wealthy, in taxes, insurance, wages to employes, and the like, the income of the poorer man is provided, and indirectly he may be said to contribute his whole income to the community. But this is not strictly true, as a certain percentage goes beyond his immediate community, or only indirectly becomes of value to it. Perhaps it will be within reason to say, that taking rich and poor together, the poor making by far the larger proportionate contribution, one-third, or 33 per cent of the average income goes to the public treasury.

The individual becoming sick, therefore, 33 per cent of the individual's contribution is withdrawn, and the community that much poorer. To be sure there are costs of such sickness, in medical services and the like, but they come out of the surplus of former earnings, or are met from future income, often far distant at that. This expenditure, however, is actual loss, as the physician's contribution is already counted in to make up the average.

On another occasion I used the following quotation, which is not without interest at this time:

A recent writer in one of the popular magazines (the *Cosmopolitan*, February, 1892, p. 13), Mr. Geo. H. Knight, in an article entitled, "The Relation of Invention to the Conditions of Life," says, in speaking of the improvement in the death-rate as shown in annual reports: "Thus the annual average death-rate in New York City, which for the decade ending A. D. 1860 was reported at 33.66 per 1,000, had in the semi-decade ending in 1865 dropped to 31.33, and to 25.54 in the semi-decade ending in 1890, the rate in 1890 being but 24.58. This improvement of 5.79 per 1,000, in twenty-five (25) years represents a saving in the one city mentioned of about 3,000 lives yearly. These results are due in great part to the advance in medical and surgical science and appliances, in part to improved plumbing, draining, paving and other hygienic inventions. If we allow a fatal termination to one in every thirty attacks sufficiently serious to call in the service of a physician, it would appear that 90,000 New Yorkers annually are exempted from sicknesses to which they would have been exposed but a quarter of a century ago. Without mentioning the avoidance of bodily discomfort, this exemption probably represents a clear cash saving of \$3,000,000 annually."

The absolute prevention of sickness, or avoidance of accident is impossible. The pursuit of any industry is a predisposing cause for injury; the complexity of our organism makes stability an impossibility. Disease is incident to human life, but that much of it is preventable, and much more capable of modification, either in shortening duration, or mitigating intensity, the above quotation abundantly establishes. There is an expectation of sickness, as well as life, it is true, but the figures are constantly changing as time moves on.

Now the foregoing all leads to this. If health has a money value to the community, loss of health stands as a money loss. Production ceases to some extent, whether the individual is rich or poor, the largest proportion-

ate loss in the case of the poor. Often to add to this loss, the sick poor become a public charge, which represents a further loss beyond that of mere productiveness. Now if the prevention of disease, or, failing that, shortening its duration, means pecuniary gain in addition to all recognized methods of public hygiene, provision for the care of the sick, under the best possible conditions, should be a legitimate charge on the public purse.

This charge can be provided for in two ways; one, the establishment of hospitals, absolutely free to those justly entitled to their services; another, public dispensaries for those who are not necessarily confined to bed or totally unable to pursue their calling. These are two important factors, but there are others that should not be forgotten, and may be mentioned in passing. Public hygiene goes without saying; suitable dwellings, pure food and water, and satisfactory sewerage stand at the top of this list. Next, and of not secondary importance, competent medical skill must be provided. Health having such a close relation to public prosperity, there can be no doubt that society must control not only the preventable causes, but take care that its restoration is provided for in the quickest, most certain, and least expensive manner. Hence much might be said about the obligation resting upon society to take charge of medical education, or, at least, apply proper tests to establish the fitness of medical practitioners to pursue their calling. It seems absurd to insist on the right of society to protect itself by preventive measures and then take down all safe-guards when necessity for curative treatment comes in.

Public hospitals and dispensaries represent an outlay of money, of course, yet at the same time stand in the relation of invested capital to the community. The cost of caring for a patient is less than if he were treated at home, and the cost per capita diminishes as the number of patients increases. If the surplus earnings of a community is a fund to be drawn upon by the sick, which is partially the case, the drafts are smaller by anticipation when treatment is in properly constructed hospitals, economically administered.

There is an objection to medical charities that is well founded, but which is easily overcome when public sentiment is properly directed. I refer to the tendency of pauperization. This operates in two ways. First, in the abuse of the privilege of those amply able to provide for their necessities. Secondly, in leading the meritorious to consider themselves with a claim on public charity. If a plan such as is outlined could be realized, the hospital tax, based on accessible actuary tables of mortality and sickness, might be so apportioned in a community that, all paying in advance for a service that the exigencies of life renders of certain occurrence, none would be recipients of *charity*, but simply make a draft on their surplus earnings. Of course this is too socialistic to hope for realization, unless it be in small and primitive communities, and yet it does touch upon a living issue.

We have in this, and many other states, state medical schools, and connected with them state hospitals. Many there are who find fault with these institutions, as a discrimination against other occupations, and wildly suggest that the State should teach trades of all kinds. Well, I am not sure that it would be improper; but in the case of law and medicine, includ-

ing collaterals with the latter—if it is true that public health and public wealth are dependent the one upon the other—the State should monopolize the education of the practitioners in the public interests and as a measure of political economy. The hospitals accomplish two things; they teach the student in the best possible way—the objective, and they make a money return to the State in the restoration to health (and consequent usefulness) of the sick and injured.

XXX.

STATE CARE FOR EPILEPTICS.*

Epilepsy is such a common and widespread malady that I may confidently say, that few of those present have been spared the painful sensation caused by seeing an epileptic spasm or fit. It has affected the human race from time immemorial. The "sacred disease" has been alluded to in both sacred and profane writings. Many causes have been ascribed for this seemingly incurable disease, and as many remedies tried. As a class they have been doomed to a life of solitude and misery. They are to be found in undesirable nooks and corners, until recently new environments are opening up for them in some commonwealths. They are now receiving much earnest thought from men and women all over the United States, and the result of this widespread interest is creating a sentiment strongly in favor of efficient state care for them. This general interest taken by scientists, sociologists, humanitarians, and others, causes the outlook for the epileptic in the present year, and further on in the future, to be brighter than ever before.

The ideas and thoughts contained in this paper are not new, but are facts and conclusions that have been developed and accepted by students of sociology, associations and conferences interested in the defective classes.

In presenting to this conference, in a retrospective and historical way, impressions, convictions and recorded experiences on this subject, I have thought best to submit what I have to say under the following heads:

First.—Their number, and condition where left unprovided for.

Second.—What has been done for them, with results.

Third.—Reasons for state care.

NUMBERS.

Statistics gathered by those who have been devoting time and energy to the study of this class, agree that there is one epileptic in every five or six hundred of the population. This would make an aggregate of more than 100,000 in the United States. On the same basis of calculation, there are about 4,000 in Iowa. In support of the above, I would say that Dr. Frederick Peterson, of New York, who is considered authority on this subject, states that there are 12,000 epileptics in New York, or about two per 1,000 of the population.

*By F. M. Powell, Glenwood, Iowa. Read at the State Board of Charities and Corrections, Burlington, Iowa, March 27, 1899.

The board of managers of the New Jersey State Village for Epileptics, reports that there are more than 2,000 epileptics in their State, with a population of 1,500,000, stating further, that there is a strong probability that not more than half the actual cases would be included in any census, private or public, because of the natural unwillingness on the part of the sufferers and their friends to acknowledge the existence of such a disease.

Investigations in Ohio, Massachusetts, Connecticut, Illinois, California, Minnesota, Pennsylvania, and other states, corroborate the foregoing statistics.

For the purpose of ascertaining a basis to compute the number in Iowa, correspondence was had, in 1897, with 800 physicians, representing every county in the state, and with the hospitals for the insane, and county infirmaries, and from these sources there was reported an actual knowledge of 2,997. From these investigations we conclude that a ratio of one epileptic to every 600 persons would be a conservative estimate.

A more recent correspondence shows that my estimate in 1897, was not exaggerated. Late reports from county infirmaries, hospitals for insane, and information through physicians, sustain data obtained in 1897.

Wherever similar investigations have been made, both in this country and abroad, the results have been practically as above stated.

Dr. W. W. Ireland, in his recent work on Mental Affections of Children, page 10, referring to the census report of Mecklenburg-Scheverin in 1882, states that the number of epileptics was found to be nearly the same as the number of feeble-minded, or one to eight hundred plus, of the inhabitants. He states further, that a later report by Dr. Bircher, for the Canton of Aaram, in Switzerland, gives a higher figure, 2.42 per thousand, or one to about every four hundred of the population.

Referring to their condition, Dr. McDonald, in "Abnormal Man," makes the following statement:—"That the ratio of criminals who are epileptics, is as six to one."

Dr. Maudsley (Responsibility in Mental Disease, page 32), speaking of the criminal class, says,—that a considerable proportion are epileptic, or have epileptic ancestry.

Dr. Wilmarth, formerly of the institution for feeble-minded children, Elwyn, Pa., later of the Norristown hospital for the insane, and now superintendent of the institution for feeble-minded children in Wisconsin, says: "Even in uncomplicated epilepsy, if the spasms are at all frequent, the sufferer's power of self-control is lessened, if not entirely destroyed, and he becomes a burden on friends or the general public. Eccheverra, after ten years' careful research in tracing the offsprings of epileptics, states: * * * excluding all cases that could not be fully verified, found that sixty-two males and seventy-four females, epileptics, begot 553 children, whose life histories were as follows: 22 still-born; 195 died in infancy, from spasms, 78 lived as epileptics, 18 lived as idiots, 39 lived as paralytics, 45 lived as hysterical, 6 had chorea, 11 were insane, 7 had strabismus, 27 died young from other causes than nervous diseases, 105 were healthy. Excluding the last three divisions, we have 414 out of 553 who either died in utero, or were affected with nervous diseases. * * * He quotes one case where two epileptics married; out of five offspring, two died of infantile convulsions, one from hydrocephalous, one lived an epileptic, and one was said to be

bright. Of his original 136 cases, 87 had parents with either insanity or epilepsy, while in 46 cases epilepsy had existed through three generations." * * * Dr. Knight, of Connecticut, * * * quotes a case where an epileptic mother bore fifteen children; eight died in infancy, two were fairly teachable imbeciles, two were epileptics, and three had sufficient intelligence to secure husbands and thus risk the multiplication of their kind.

The same authority states that more than sixty per cent of the histories of children received into institutions for the feeble-minded show epilepsy as a cause, or as a complication, and he further states that the marriage of epileptics is one of the greatest sources of the increase of imbecility, and I may further add, that it is a source of increase of crime and pauperism.

Dr. George Shrady, in the *Medical Record* of September 16, 1893, makes some interesting statements, the result of accumulated experience: "They (the epileptics) are promiscuously distributed throughout our midst, in varied social conditions, some filling positions of importance, a few, perhaps, coupled with genius. Many of them are cared for by relatives or friends, and the freedom from restraint which they enjoy is a constant menace to life and property."

Dr. Rutter, superintendent of the colony for epileptics at Gallipolis, Ohio stated to the National Conference of Charities and Corrections at Toronto 1897: "The nature of his disease has made him an object of pity and indulgence to his parents and relatives, while his irascible temper, and, as a rule, his unreasonable disposition, makes him a citizen with whom argument is anything but desirable by his neighbors.

Dr. John Morris, of Baltimore, says: "Compared with epilepsy, idiocy, even insanity, is a blessing."

My own investigations for a number of years past has led to positive convictions regarding the epileptic. A development of the malady usually darkens all the patient's prospects in life. However domestic his disposition, he cannot consistently anticipate a home of his own. He is largely shut out from ordinary occupations. He is an unwelcome visitor in the social circle, and his own sensitiveness leads him to shrink from joining it. The tendency is for the public to shun him, fearing they may be called upon to witness a convulsive seizure. If he ventures upon the street he is liable at any moment to fall violently to the ground; if he remains at home he is in danger of falling down stairs, or against the sharp corners of furniture, or upon a hot stove. He and his natural guardians live in perpetual dread. Illustrating this I find that probably 25 per cent of the epileptics now under my care, presented upon admission, evidence of injuries in various degrees of severity, the result of falls, burns, etc. They sometimes show a destructive impulse and may attack and kill a stranger toward whom they have not even a cause of annoyance. They are prevented from attending the common schools. The individual attention required is very exacting, and in attempts, on the part of parents, to restore the child to a normal condition, their anxiety leads them to expend all their resources to find out later that their efforts have been in vain. Many such instances have come under the writer's observation. About two weeks ago a mother brought a son to the institution, aged sixteen years, second child of a family of six children. For years past the parents have been seeking relief for their unfortunate

son, visiting Chicago, St. Joseph, Kirksville, Mo., and elsewhere, until their resources have been practically exhausted. The history of the child indicates that it is an incurable case of epilepsy, with positive evidence that the boy will continue to retrograde. Illustrating the danger to others, I mention a girl, fifteen years of age, who has been under observation for about seven months. At times the furor following, or taking the place of an epileptic seizure, is of such a nature that unless restrained, she will injure those about her. On one occasion she narrowly missed striking the writer in the face with a hatchet, and her attendant narrowly escaped injury at her hands. At these periods she is destructive to furniture, and in her fury exhibits great cunning and almost superhuman strength. Her history prior to my observation, shows that she was absolutely dangerous to the neighborhood in which she lived, and nothing but restraint prevented injury to property and person. This girl, if allowed to be at liberty, is a menace to society, but under appropriate environments there are prospects of betterment, if not a cure. She would, at any rate, become helpful, a producer to some extent.

The above illustrations represent rather the darker side of the epileptic, and perhaps the tone of the paper may be shaded heavily in that direction, yet I must say that there are a number of epileptics whose lives are not so gloomy as the foregoing, and who present rather a more favorable picture, yet the nature of the malady is in every case the same, and treatment by the State is as necessary for these latter, as for the less hopeful.

WHAT HAS BEEN DONE FOR THEM.

In substance, I have said in a previous paper. Prior to 1860, Rev. John Bost, of La Force, near Bordeaux, France, added a cottage for epileptic girls to a small colony he had founded and maintained for epileptic children. This individual effort was the basis from which the now well known colony system originated. The one which has attained the greatest prominence is the Bielefeld colony for epileptics in Germany, now caring for about 2,000 epileptics. This was established nearly thirty years ago by Pastor Von Bodelschwing.

In part, Mrs. Lucy Rider Meyer says: "Von Bodelschwing has two ruling ideas; first, that the only healthy normal life is one of work. Every one at Bielefeld, unless too ill, is at once given something to do. His work is suited to his ability, and, so far as possible, to his taste. The gentlemen and ladies who are paying \$500 a year for board and care, sometimes rebel at first. 'Why should we work?' they ask him, 'we are not used to such things, and we pay well for our keeping.' He replies, gently, 'The privilege of work is a part of what you pay for. Work is God's law, not mine. No one can be well and happy who does not work, and *you must work.*' So, no matter how much they pay, they put in their eight hours a day, and sleep and eat the better for it. "The other great thought in Von Bodelschwing's mind is, that the body can never be well until the soul has first found rest and peace in Christ; so his patients, his people, as he delights to call them, are from the first lovingly, steadily, taught to look to God."

Others who have visited this colony, refer to the value of labor as being exemplified in the diversity of industrial teaching going on. The constant activity manifested is suggestive of a veritable bee-hive. Woodworks of various kinds, is carried on; tailoring, farming, boots and shoes manufactured, etc. There is a systematic training in productive energy, that in addition to the economic feature, its beneficial effects as a therapeutic agent can hardly be estimated, worth more than all the drugs in the kingdom. This, with selected and well regulated diet, produces wonderful effect upon the health and morals of the patients.

I refer to this colony particularly, as in this and other countries already similar ones are established, and conducted on the same principles.

Ohio ranks first in the United States to make public provision on the colony plan, for this class of crippled minds, and located it at Gallipolis, in 1891, and cares for 600 patients.

In 1882, Massachusetts maintained a small hospital for epileptic children, but is now caring for 200 patients at Monson, on the colony plan.

The legislature of New York passed an act for establishing the Craig colony for epileptics in 1894. The colony is provided with 1,872 acres of land near Mt. Morris, the postoffice being Sonyea. It is equipped with cottages, shops, schools, etc. In the main, it is following the plan at Bielefeld, Germany. This colony was caring for 302 patients at the time of their last report, and is extending its capacity.

Missouri has an institution for epileptics and feeble-minded at Marthasville, Warren county, supported by the Lutheran church.

Within the last two years a colony home for epileptics has been established at Oakburne, Chester county, Pa.

New Jersey has, in the present year, established an epileptic village under state provision.

California favors cottages for epileptics in connection with the institution for feeble-minded children, also Pennsylvania, Minnesota and Michigan. Iowa now cares for about 200 at the institution for feeble-minded at Glenwood.

A recent letter from Indiana informs me that the legislature of that state passed an act for establishing hospital care for epileptics, but the bill was vetoed by the governor.

Other states are agitating similar movements.

The thinking public is interested. They are learning to know that it is not only a humane provision, but it is also political economy.

A recent letter from General Brinkerhoff, of Ohio, states that "the establishment of the epileptic colony at Gallipolis has demonstrated beyond question that the colony system for this class is far superior to the old plan of associating them with the insane. It is a great relief to both classes, and our state is wholly committed to the separate colony system."

A recent letter from Dr. F. H. Wines, of Illinois, states: "I am very much in favor of epileptic colonies, believing as I do, that no class of unfortunates are more to be pitied, or more burdensome to their families, and that while they cannot live in comfort, or be usefully or profitably employed at home, there is much that they can do in a colony for themselves and companions. There they are not objects of aversion, but of sympathy, and they are disposed to be mutually helpful." And he further states that he

is hopeful for favorable legislation for this class, in Illinois, during the present session.

It is true that every state has cared for some epileptics, either in hospitals for the insane or institutions for feeble-minded, and county care has been given in alms-houses. But accommodations in these institutions have been unsuitable for their management or welfare, as attested by those who have had opportunities for observation.

Through the courtesy of Dr. Hoyt, I received a report of the State Commissioners in Lunacy of California. This Commission states that the separation of the epileptic from the insane has long been recommended by those having charge of hospitals for insane. * * * As it is now, a sane epileptic, who is so unfortunate as to be without means, must do one of two things, either lead a precarious and miserable existence at large, or look for relief in the halls of the hospitals for the insane." This Commission favors a plan by Doctor Osborne, superintendent of the California institution for feeble-minded children, viz., to build cottages for epileptics in connection with the institution under his management.

REASONS FOR STATE CARE.

It has been well said (Hon. W. R. Stewart, page 2, National Conference of Charities and Corrections, 1898,) "that the State owes no higher duty than the protection of its citizens from the dangers and pollutions incidental to the unrestrained commingling of defectives with the people generally, nor is there a greater evil than the increase of their kind. Wise public policy requires that for these unfortunates uniform and suitable custodial care or restraint should be provided by the State."

Dr. Frederick H. Wines in *The Charities Review* for Feb., 1898, says: "The right of the state to appropriate funds for the relief of suffering and for the maintenance of the destitute may be vindicated on many grounds,—on that of the solidarity of the race. * * * of public policy, and of the prevention of the growth of the special classes whose existence is so closely related to that of social evils. It rests primarily upon the doctrine that every civic corporation is in fact a brotherhood, and that brotherhood implies equality before the law. The millions expended annually in the so-called public charity, from the public revenues, are the best proof that the popular heart is a heart of love and tender sympathy. Every man who needs help has the right to expect it, in the first place from those nearest to him in blood, affection, or locality, but his ultimate appeal is to the whole human race, and the state ordains that this resource shall never fail him. Indeed, where it is certain that individuals cannot, or will not give what is really needed, or, that if they do, they will thereby impoverish or otherwise injure themselves, or their families, the state anticipates the demand, and provides help without waiting to be asked to do so. The government thus plants itself upon the principles of the Lord's Prayer, and the sermon on the Mount. In making this provision, it merely enforces upon the unwilling and the recalcitrant the fulfillment of a natural obligation to their brethren in distress, however remote may be the tie of kinship between them."

Iowa, in carrying out its obligations for the benefit of its citizens, provides liberally for the education of the normal child, for the deaf, the blind, the dependent orphan, the incorrigible youth. It provides for the care

and treatment of the insane, for the training of the feeble-minded, for the incarceration of those committing legal offenses, not as a charitable act, but as an expenditure of public money for public good,—that is,—the good of the whole mass of the people. It is based upon the good of society. It is the object of the government to promote the general welfare of the people. In this onward march of providing for the necessities of the normal and abnormal, this needy and deserving class has been left without that paternal care which the state alone is adapted to give. For a number of years the necessities and claims of the epileptic in our state have been advocated, more particularly by physicians and those in charge of state institutions, and in the Twenty-Sixth General Assembly a step was taken toward making suitable provisions for them, a bill being presented by Dr. Lauder, of Union county, having for its object the establishment of a colony for epileptics. This bill was favorably acted upon in the house, but failed to pass the senate.

Referring again to my own experience, it has been my duty, or privilege, for many years past, under direction, to receive into an institution, established and equipped for a special class of defectives—the feeble-minded—hundreds of these sorely afflicted people, and listen to their sad histories as given by burdened parents, many of whom have advanced to that period of life where the future welfare of their progeny crowds heavily upon them. The mother bowed down by an imbecile or epileptic child, is one of the most pitiable objects in the world, for her burden of helplessness, grief and care, must increase rather than diminish with passing years, and to many an aged parent has come, and will come, the thought—who will care for and guard my afflicted child in the future? The very thought of a child of this nature being left without suitable protection, is painful in the extreme, not only to a parent, but to all good citizens.

Ex-Governor Jackson, in his message to the Legislature in 1896, referring to the necessity of providing for epileptics, illustrates the advisability of this by the following simile: “A few years ago an immense Russian thistle was driven over the prairies of South Dakota by the north-west winds, across the State line into Iowa. It rolled on for forty miles across one of our most productive counties, scattering along its trail millions of the seeds of this weed which is so dreaded and so dangerous to agricultural interests. A vast amount of labor was required to destroy the havoc created by this one weed. Most surely in adopting measures of extermination, no intelligent people would be content to let the thistle roll on and on, and to expend their energies in undoing damages. On the contrary, intelligent legislation would be in the direction of preventing the reproduction of this noxious weed.

“I have in mind a poor feeble-minded young woman, whom the laws of Iowa had failed to properly protect because she was past 18 years of age, and the doors of the State institutions were closed—drifting about in society—an easy victim of criminal intent, whose journeyings through counties of our State can be traced by her unlawful progeny of imbeciles and criminals, several of whom are already inmates of State institutions, and a permanent charge upon society. An important question for your consideration, gentlemen of the general assembly, is whether society shall legislate intelligently and humanely in the direction of its own protection, or whether these matters shall be left like the Russian thistle to roll on

and on. Nor is the question of the expense to the State the only thing to be considered, for the society which will permit the perpetuation of imbecility is much more to blame than the individual who, through weakness of intellect, is lacking in personal responsibility.

"Scientific authorities all agree that more than 50 cent of the muddy stream which is swelling the population of our state institutions with the epileptic and the feeble-minded, comes from heredity. Both economy and humanity demand that these two classes of population should be cared for and protected by colonization. The suggestion has already been made that in the near future the epileptic classes should be colonized as far as practicable. But for the present the scope of the magnificent institution at Glenwood should be extended by the opening of its doors to those of all ages, and by the purchase of additional land, if necessary, by the building of additional cottages as required, and by colonizing as rapidly as possible these classes of unfortunates. I believe it would be economy to the State and humanity to these people to make an intelligent and earnest effort to clear the fountain pool of the polluted stream rather than to let it flow on unmolested in all its impurity, carry with it the burdens of expense to the State and of crime and misery to the afflicted."

Illustrating the thought before us, I recall to your minds the "Jukes family," investigated and forcibly presented by R. L. Dugdale, of New York. This remarkable history of heredity covers a period of seven generations, nearly every one of whom are classified as an idiot, murderer, prostitute, thief or robber. The tabulated expense to the public for this family for seventy-five years, amounted to over \$1,250,000.

Another striking example, illustrating the transmission of infirmity or degeneracy, and the consequent entailment of vast expense to the public, which would have been largely obviated by timely sequestration is to be found in the history of the so-called "tribe of Ishmael," as given by the late Rev. McCullough, of Indianapolis. A history of this family and its consequences will be found in the report of the National Conference of Charities and Corrections, for 1888, and is well worth the perusal of any one interested in studying degeneracy. Mr. McCullough states that the public expense record for 1876, paid by the township for public relief was \$90,000, three-fourths of which went to this class.

Further evidence of opinion regarding state care for epileptics, is indicated by a resolution passed by the Iowa State Medical Society, in 1893: "Resolved,—that in our opinion it is advisable for the state to establish and maintain a hospital for the care and treatment of epileptics, consisting of a system of cottages for the accommodation of both sexes, for children as well as adults, for the sane as well as the insane, for the cure of cases where complete and permanent restoration is possible, for the education of those who are susceptible of it, for furnishing occupation, amusement, and an isolated home for all sorts of persons afflicted with epilepsy."

In 1896 the Medical Society of the Missouri Valley passed a similar resolution. We might go on and quote similar conclusions from other states and sources. Dr. Hill, the late Dr. Gilman, Dr. Hoyt and Dr. Witte, superintendents of the hospitals for the insane in our own state, are on record favoring state provision of epileptics on the colony plan. The Hon. Ed. C. Stokes, of New Jersey, sums up the duty of the state to its defective classes

as follows: "No man wants to live in a lawless community, where life is unsafe against the assassin's bullet, and we regard that as a weak government where life and property are not well protected. As a part of its duty in preventing crime, the state must exercise the supervision of all defectives of whatever character. The law holds these people irresponsible for their acts, and excuses them from punishment on that plea. But lack of legal responsibility does not lessen the danger to which the community is liable from this class. The man who drowns ten feet from shore is just as dead as the man who drowns in mid-ocean. The bullet which is sped by the irresponsible hand of the insane man is just as fatal as the one shot by malice. The death of Garfield, at the hands of Guitteau, shocked and appalled the nation, but that act differs nothing, save in consequence to the American people, from many acts which persons on the border line of insanity, imbecility and crime are likely to commit at any time. No state, therefore, in its capacity as a policeman, can afford to neglect a strict censorship over all classes who are mentally defective or degenerate, and are therefore likely to do harm. It should never permit in any community, the freedom of men like the Jukes, until crime compels recognizance of its presence. In modern civilization, the contact between all classes is so close that it cannot be severed. We live in an age of close contact; we all touch elbows; we are part of a great social organism. We look at the mechanism of a watch, and it is composed of wheels, cogs, levers, springs, jewels and screws, some of them so fine they cannot be perceived by the naked eye. Let one of them be deranged, and the whole mechanism is thrown out of joint. So we to-day are not isolated individuals; we are part of a social organism, and if one of us is ailing or defective, that whole organism is thrown out of joint. The poisons and germs which are generated in the dwellings of the ignorant and degraded carry pain and death into the homes of the intelligent and the comfortable, and any state that fails to anticipate the dangers which arise from neglecting the criminal, the diseased, or the dependent element of society, is simply sowing the seeds of its own destruction. * * * So our dependent classes, through no fault of their own, infect the communities in which they live, infect us, and infect society down along the generations to come, with their ailments; and the society whose duty it is to protect the general welfare, cannot neglect its obligations in this direction."

It may be interesting to you to know more fully what constitutes a colony for epileptics. Dr. Peterson, of New York, recognized as authority on the subject of epilepsy, says: "There is but one kind of an institution which can meet the case of those who suffer with this disease. No asylum, no large hospital, no single vast building in a large city, is appropriate for the purpose. It must be an establishment combining many unusual features. It must have schools and teachers for the young epileptic. It must have offices, shops of all kinds, stores, dairy, farm, gardens, granaries, for, as they grow up these patients should acquire trades or professions. It must have a group of small hospital buildings and asylum, where such as are sick or mentally infirm may be cared for. It must have skilled physicians. It must have a church, amusement hall, gymnasium and bathing establishment. It must have, finally, a pathological laboratory, presided over by the keenest pathologist obtainable, so that, in the course of time, a cause and a cure may be discovered for this terrible disease. Such a place would not be a

hospital in the ordinary sense of the term. It would be a village in itself, a colony for epileptics."

Dr. Spratling, in his report for 1896, stated that "A daily average of 83 per cent of all male patients have been employed as follows: On the farm, 21; in the gardens, and about the grounds, 16; in shops, 11; in clerical work, 3." No account taken of housework. The 83 per cent refers to eight hours' labor. Seventy-four per cent of all female patients have been employed.

In a few words, colonization for this class is advocated for the following reasons:

First.—It accomplishes better results to the sufferer than any other plan so far known.

Second.—It is in the line of prevention and will relieve society of a menace.

Third.—It is economics.

The question may be asked, where do you expect to find patients for this contemplated colony? In answer to this I would say that, as a nucleus, there would be a few from each of the hospitals for the insane, a large number, perhaps, from the institution for feeble-minded children, and a greater number still from county almshouses. From these three sources I estimate at least two hundred eligible sane epileptics.

I would emphasize the importance of a colony being located in a rural district, within reasonable distance from a city of at least second-class size, centrally located, with an abundance of good water and natural drainage, so vital to the best interests of any institution. Through my own observation in the management of feeble-minded and epileptics, I am convinced of the advisability of providing a large acreage, at least one acre for each prospective inmate, desirable both from a hygienic and economic view.

Secure a large tract of land first, and gradually construct buildings, giving ample time and experience to mould the work to meet developments.

[The Iowa State Board of Health most heartily commends the humane and economic suggestions contained in Dr. Powell's paper, and believes that no delay should be made in securing an eligible site, and adopting plans for the colonization of this class of unfortunates. No more important measure can be presented for the considerate action of the Twenty-eighth general assembly.—SECRETARY.]

XXXI.

LOOKING FORWARD AND BACKWARD, OR BETTER CARE FOR OUR CHRONIC INSANE.*

During the year 1897-8 a healthy progress has been made by the three Iowa hospitals for the insane located at Clarinda, Independence, and Mt. Pleasant, both in the appliance and facilities for pathological, surgical and gynecological work, as well as in industrial features, and in the extent and character of work accomplished, in every direction. A special effort has been directed towards inspiring patients to habits of industry and usefulness to themselves, and incidentally to the hospitals, by learning them trades, such as that of tanners, shoemakers, broom-makers, mattress-makers, cabinet-makers, printers, seamstresses, etc., etc., and at Independence an industrial building for men has been erected for this purpose, which will add greatly to the accommodation of their working force. At Clarinda the industrial feature has been in an advanced stage for a longer time with eminent success, and during the past year two infirmary wings have been finished in a most complete manner for both sexes, with aseptic rooms connected with all the facilities necessary. Female trained nurses are in charge of these wards, and on the male ward a man and his wife assist the head nurse. These are model wards for the sick. Constant progress is the motto at both these ably managed institutions. At Mt. Pleasant an infirmary building for the aged, feeble and infirm men has been constructed, and occupied, much to the comfort and convenience of this class. It was planned but one story high, so as to permit this class to be out of doors as much of the time as possible, and broad verandas have been provided for exercise and sitting places at all seasons of the year, while there are cheerful open fires for the excessively cold weather. Two aseptic operating rooms for the male and female divisions of the hospital have been completed, and hospital wards for the acute cases of sickness, and surgical cases, have been furnished with conveniences for this purpose, and a trained female nurse has been placed in charge of each such ward, with a female and male assistant on the men's ward, and two female assistants on the women's ward, with night nurses constantly on duty in both. The work in the industrial buildings has been carried on with some increased facilities. A deep well, 1,267 feet, furnishes what we have needed for years, an abundant supply of pure water.

*By H. A. Gilman, M. D., Mt. Pleasant, Iowa.

While this subject is under consideration the question of work as a part of the treatment of the insane should be thoroughly considered and cannot be too emphatically, especially in connection with the cases of chronic insanity and convalescents, when carefully directed, when strong enough to exercise. All the patients as a rule in such institutions should be out of doors in the open air as much of the time as possible, and every one able to do so should perform such labor as best adapted to their individual cases. This, of course, should be directed and prescribed by a physician, and the instructions carried out by the nurse or attendant. Of course, in no case should the patient be required to perform any task beyond his strength or physical capacity. Every patient thus able to be employed has his mind diverted into healthy channels, his physical health is improved, his appetite is better and he requires no tonic, drugs or hypnotics to produce sleep, beside in the industrial buildings he is taught one or more trades which aid him in securing a livelihood for himself and family if he recovers and returns home, while he is also useful to the institution as long as he remains. The parole system is rapidly becoming unpopular, save as the parole is earned by industrious habits. The patient who is permitted to go out and wander aimlessly about is apt to become a gentlemanly loafer, and when he goes home the habit often follows him, and instead of industry there, the education he has received has made him too lazy to pick up the tangled ends of toil as he left it, and many as a result drift back to where they think they can have an easy time. The old proverb, "An idle brain is the devil's own workshop," was never better illustrated than in a hospital for the insane, and idle hands should be added. Of course all these industrial pursuits are interspersed with healthful amusements and games, music and worship, and a greater zest is manifested by those who are industrious. Each institution has a band, orchestra, dramatic club, magic lantern for illustrating lectures, and a literary society for settling the tariff and finance questions; chess, checkers, backgammon, cards, billiards, pool, etc., afford amusement in the wards when unable on account of the weather, or other causes, for the patient to be out of doors.

With nearly 600 acres belonging to each institution the farming operations are quite extensive, the principal crops being corn, grass, oats, potatoes, garden vegetables of all kinds, and in abundance for the entire year around; also small fruits, such as strawberries, raspberries, blackberries and grapes in abundance in their season. The farming and garden operations furnish healthful employment to the larger number who are industriously inclined. We have a herd of 125 cows and all the milk is distributed through the wards. About 300 hogs of the Poland China and Chester White varieties are annually raised on the premises, and mostly slaughtered and served to the patients. A well-filled conservatory for flowers is a joy forever.

With the advancement that is being made, as but feebly illustrated, in all these hospitals, and a fourth one of like character, under roof, it must seem incomprehensible to you, who have not been members of the legislature, that here in Iowa with only 2 per cent of illiteracy, with no bonded debt, and with but 2 and 8-10 mills tax levy for all state purposes, there is now being nurtured what is called the county system of caring for the insane and several counties have already constructed, recently, asylums quite

pretentious in architecture and at a cost of many thousands of dollars, the principal excuse being that they could more cheaply care for the chronic insane in that way than at the State hospitals at 46½ cents per day—this including board, clothing, bedding, carpets and rugs, curtains and fixtures, table linen and furnishings, medical attendance, drugs and medicine, salaries and wages of all officers and employes, fuel, light, laundry, amusements and entertainments, and minor repairs. It is demonstrated, these advocates of this system say, that the expense is but 25 cents a day or less at the county asylums. You gentlemen all know what this quality of care means—simply “keeping” the unfortunate invalid until the final summons brings coveted release. In meeting and attempting to controvert the argument of the advocates of this plan, we have perhaps, in explanation, been too apologetic, fearing that in some places we might be considered in advance of public opinion, so far as the expenditure of public money is concerned. We have desired to convince and not offend by too aggressive expression of our opinions in this direction; to obtain a hearing for our ideas and not stir up angry opposition in those who do not accept them. The last general assembly of our State reduced the per capita to 39½ cents per day, ostensibly to meet the argument of county supervisors that their chronic insane can be cared for by the counties so much less than by the State, and consequently, they advocate the county system, and the construction of these county asylums. It seems to me that to every thoughtful, humane man, be he professional or layman, this must appear a backward step towards that period when pathology was not recognized as the basal cause of all mental unsoundness and obliquity, towards that era when the unfortunate victim of brain disease was thought to be possessed with devils. The county house or asylum, even the best arranged, have appliances only for detention and custodial care, with comparatively little or no medical attention, no classification; the noisy, turbulent and untidy being cared for in the same day rooms and dormitories with the quiet, orderly and neat patients. It is not strange that those not entirely devoid of mind should in despair, when transferred to such accommodations, exclaim, “All hope abandon ye who enter here.” In a few of the more recently constructed edifices there has been an attempt to improve this care by humane and conscientious boards and officials, but the great aggregation of them are still unfit for the residence or home of the afflicted, and some are actually not in keeping with the accommodations now provided for our fine herds of cattle and blooded horses. The manager is selected because he is the lowest bidder, and if any medical attendance is provided the same rule of selection obtains, and as a result, someone entirely ignorant of the proper management of the insane is chosen to be responsible for those who perhaps have been educated, refined and of sensitive dispositions, untrained and unaccustomed to the rough experiences and manner of life thus provided.

The doctor may visit once a week, or month, or whenever it is deemed necessary by the manager, who knows little or nothing of the delicate organization of the human body or its needs. There are no trained nurses there to minister to the sick in body and mind, or soothe the last moments of the dying by tender ministrations of words of comfort and Christian consolation, because, forsooth, this would result in an expense that would do away with the much vaunted economy of such a system. I have witnessed

scenes in such places (we cannot call them asylums) that would bring the blush of shame to our boasted civilization, and had rehearsed, by persons in charge, such sentiments of cruelty as would do justice to a barbarian, and stir the hot blood in every sympathetic, philanthropic heart. "Can these things be in our State," said a noble soul, a newspaper man, some years ago, with tears rolling down his cheeks, "and I never have known it?" "Go and see for yourself," was the response, and, as a result, his splendid ability and great sympathetic soul advocated full accommodation and care, under State supervision, with all that it meant, as long as he was a resident of the State. We need more such philanthropists who are willing, now, to sacrifice temporary popularity in the locality where this gangrene is burrowing deepest, who are willing to acknowledge their ignorance and inform themselves of the situation right at their own door, and use all their God-given powers to secure the remedy, which is, the placing of all the insane of the commonwealth under State care and supervision, with proper medical attention and the ministrations of nurses educated for the purpose. It seems that the object lesson of so many States who have attempted the experiment of county care, and the wretched failure, loss and suffering which marked the trail of their experiment, would bring wisdom in counsel, philanthropy in action and economy, as well as humanity in results, to those States now agitating the question.

There is another phase of this question of "better care for the chronic insane" which comes closer home, and may be felt within the hospitals with which we are connected. In some measure, we, as superintendents, are responsible, and with the parsimony of the legislative power lies the remainder of the accountability for this, viz.: the lack of individual treatment of this class. There is a large number where there has not been sufficient destruction of cell structure or brain tissue to largely impair the mental operations, where there is a stay in the progress of the disease, and yet, it does not seem to be the best thing for the patient to discharge him and throw him upon his own resources. There are many of this class, and thus grading down to complete dementia, that by proper, well directed care may be entirely cured, or very materially improved, so as to be able to live at home, comfortable and useful lives. Is it reasonable that any of us would say that placing under the care of one physician from 200 to 300 of such cases is such attention or individualization as they need, or that will bring the best results? I think not, and yet, we are forced to that by the paucity of funds which are allowed for the salaries of physicians and nurses. It may be that a good many of these patients do not require much medicine, but the actual administration of drugs is a small part of the treatment of such cases. The personal attention of the physician, studying the case, drawing them into conversation, noticing the character of their delusions, if they have any, the diversion of the mind into healthy channels, cheering the despondent by words of comfort, stimulating to action the stupid and cases of mild dementia. All the entertainments and exercises of like character are helps in this direction, but such individualization as would seem more efficient is, where and when there is an opportunity, to thoroughly and conscientiously study the individual patient, and thus endeavor to see what labor or entertainment is best adapted for the case in illustration; if labor, see that it is properly prescribed, and it should be admin-

istered carefully, as any other dose of medicine; if other recreation the same rule applies. This cannot be done to the degree that is at all satisfactory to superintendents, without a larger staff, and it ought not to be considered creditable or satisfactory to the physician who is thus hedged about. The same thing applies to the lack of nurses for such tedious work, and it does become tedious unless there is a consecrated life in the helper and true charity for the unfortunate victim in question. If we could have an assistant physician for every hundred, or better, fifty patients, and a nurse for every eight or ten patients, instead of twenty-five, we could treat with favorable issue, many more, and make more comfortable a large number now not having, as I believe, the individual care and attention necessary for the best possible results.

The rapid strides made in the past decade in the care and treatment of the insane should be recognized by the law-making power of every state, and ample appropriations made for all the necessary appliances to carry forward the new method evolved for the betterment of the condition of the insane, acute or chronic. Scientific education is rapidly crowding the newly discovered enunciations of the investigator, and if we would keep up with the procession and accomplish the greatest possible good to the greatest number we must, as states and individuals, recognize the new daylight that has dawned upon us, prepare equipments, and be equipped for our work, with all that modern science presents for our aid and development. County care is not in this line of progress, neither the lack of individual care on account of the paucity of physicians and nurses, nor the parsimony of legislators in providing the necessary means for advanced ideas in every direction, as applied to the treatment of the insane. As in all other diseases the acute case may need the close attention of physician and nurse, temporarily, but the chronic case demands the steady hand and helpful care of the nurse and physician month after month, and sometimes year after year, and then, recovery at last. We must have as our motto, "While there is life there is hope," and in those cases where there is present no organic disease remarkable results after years of dementia have been observed. There is a class, however, from whom the blight of disease cannot be lifted, and while those restored go home to friends and their pursuits, these remain from year to year, with the cloud still hanging over them. Here duty and humanity call upon us to cause a rift in the clouds, letting the sunshine through, speaking loving words of cheer, diverting to pleasant thoughts and comforting the despondent and weary hearted. The care of this class calls for even greater sacrifice because of the hopelessness and discouragement existing, but, this is Christlike humanity that we consecrate our lives so that all these conditions may be met by us and the remedy applied.

XXXII.

SEWAGE DISPOSAL ON THE FARM AND THE PROTECTION OF DRINKING WATER.*

INTRODUCTION.

The conditions under which homes and their surroundings are kept healthful in the city and in the country differ in many respects, although the principles underlying them are essentially the same. In the city the sanitary condition of homes is maintained chiefly by a system of co-operation and centralization which brings into existence extensive sewerage systems, water supplies, and the collection of house waste by public authority. Regulations are prescribed and enforced under which the individual household must avoid all conditions which are likely to prove dangerous to the health of the immediate neighborhood and of the entire community. In the country districts, and more particularly in isolated homesteads, the conditions affecting the health of the household are largely in its own hands, and more individual effort is required to maintain healthful surroundings than in cities. The farmer must supply himself with his drinking water and must get rid of the waste of the household as best he can. On the other hand, the inhabitant of the country is in many ways better off than the dweller in large cities. Not only has he pure air to draw upon at all times, but he can supply himself often with purer food than is possible in large communities. Though he must procure for himself drinking water, he is, in most cases, able to get a purer water from the ground than the sewage-polluted fluid which is the only water accessible in many cities. While he must get rid of night soil himself rather than have it disposed of by a water-carriage system conveniently located within the house, he may avoid the annoying complications of plumbing, bringing with it the leakages of sewer gas, the plugging up of soil pipes by the roots of trees or by articles carelessly thrown into them. Moreover, he has it often within his power to acquire sufficient land around his house to take charge of all sewage and waste and to utilize it as a manure for enriching the soil. Nevertheless, it must be acknowledged that when the circumstances under which healthful surroundings are procurable are under the immediate control of each individual household they are apt to be perverted through ignorance and neglect. Conditions may then arise which are not only unfavorable to health, but which are likely to lead to severe sickness at any time when the opportunity presents itself.

*Theobald Smith, M. D., in *Farmers' Bulletin* No. 43, U. S. Department of Agriculture.

Standing between the fortunate inhabitant of a large city whose water supply and sewerage systems are above reproach and the farmer who has it within his power to make them so with reference to his own wants, is the half-developed village or town, with its chiefly unsanitary conditions. Here the leaky cesspool still exists, close by the family well, or by the neighbor's well. The absence of any system of collecting garbage and miscellaneous waste shows itself by the littering of the yards, the alleys, streets, and even stream beds with all kinds of refuse. In some towns the premature introduction of a water-supply system causes the ground to become still more thoroughly saturated with diluted sewage, so that the wells of those households not yet connected with the water supply are a continual source of danger. In such communities, appreciation of the necessity for a public control of sanitation has not yet made much headway. The acts of each family violating the laws of health not only react upon itself, but upon the immediate neighborhood, often with disastrous results. When typhoid fever has once gained a foothold in such communities it is apt to develop into an epidemic.

The tendency of our population to concentrate in villages and towns makes the sanitary improvement of such communities a most important and vital condition of national health and prosperity. The following pages are not intended for these communities, for they need, in most cases, the advice of sanitarians and sanitary engineers, acquainted with local conditions. Still, they may be of service in pointing out the dangers which may and do actually beset the population that neglects to dispose of refuse and waste in a manner which does not clash with the laws of health.

The chief dangers which threaten rural inhabitants are those arising from polluted drinking water. This is infected from the household excrement and barnyard drainage, as will be described farther on, and its use leads in the main to bowel disturbances, typhoid fever, and dysenteric affections. It might be claimed that in an isolated homestead the danger is absent because the night soil from the healthy household cannot contain the germs of typhoid fever, and, therefore, the well water cannot receive them from leaky cesspools and surface drainage. This would be true if the family lived secluded from other human beings. As the case stands, there is much more communication than is at first thought supposed. There is more or less coming and going of farm hands and other hired help, of tramps, peddlers, etc. The farmer travels more than formerly. He frequently visits neighboring communities. The children go to school. As it has been shown that there may be mild cases of typhoid fever passing unnoticed, in a farm hand, for example, who leaves on account of ill health, perhaps, and who has meanwhile, in his discharges, deposited the germs of this disease on the premises, it is evident that isolation nowadays does not exist except in remote, thinly settled regions, and that disease germs may make themselves suddenly felt in an unexpected manner in any farmhouse.

There are other important reasons, however, why rural sanitation should not be neglected. The health of the large communities of people who draw their food supply from the country is in a measure dependent on the health of the farming community. There is scarcely a city child who is not, in a degree, dependent for its health on the sanitary conditions prevailing in the house of the dairyman. Milk has been repeatedly shown to be the

means of distributing typhoid fever and other diseases. Any vegetable foods from the farm eaten raw are liable to become carriers of infection under unsanitary conditions.

In many parts of our country other causes operate in making the health of many people depend on the proprieties of country homes. The thousands of city people, who flock every summer to the country and bring to the farming community considerable sums of money, should be properly protected against the dangers of polluted water and infected milk by the adoption of suitable methods of sewage disposal. Too frequently those who left the city for the purpose of gaining strength by breathing pure air, drinking pure water, and eating pure food, only return with the germs of an often fatal disease within them to swell the typhoid statistics of our large cities.

DISPOSAL OF SEWAGE.

The vital thing which thus presents itself is the disposal of fecal matter and other refuse so that the wells, upon which most rural families depend for their drinking water, may remain pure. To this matter we will first turn our attention.

Every person who tills the soil is acquainted with the remarkable transforming power of the superficial layers of the earth upon manure and excrement. Out of these offensive wastes harmless substances are produced which are essential to the growth of vegetation. This power, known as decay, is now generally attributed to very minute organisms (bacteria) which are found in immense numbers in the superficial layers of the soil, which diminish in number as we go deeper, and which completely disappear below a depth of six to twelve feet, according to the physical condition of the soil. Bacteria are more numerous where waste and excrement are most abundant. When night soil and manure are deposited in excavations or so-called cesspools in the earth, from which the fluid matter may enter the ground at some depth below the surface, where the air or certain kinds of bacteria can penetrate only to a slight extent, the substances, which under the influence of the air (oxygen) and of bacteria near the surface, would have decayed, now undergo partial putrefaction with the setting free of disagreeable gases and odors. The deeper layers of the earth slowly become saturated with organic matter, which is carried by the ground water into the wells or springs near by. There is also some reason to believe that disease germs live longer in the oxygen-free depths of the soil than at or near the surface.

The extent to which the filling up of the soil with excrementitious matter may go on in densely populated cities has been shown by Fodor for the Hungarian city Budapest. By analyzing the soil at different levels from the surface to a depth of about 13 feet, he found, over an area comprising 15 acres, about 1,000,000,000 pounds organic matter, equivalent to the excrement of 100,000 people voided during thirty-seven years.

To the surface of the earth we owe thus a purifying influence whose activity furnishes us vegetation and food on the one hand and preservation from disease on the other. This purifying power is not possessed by the deeper layers, and therefore the percolation of organic refuse into them from deep cesspools is wasteful to agriculture and dangerous to our storehouse of drinking water.

FIG. 1.—The shallow barnyard well, with privy vault and manure heaps near by. The water is likely to receive fluid from these at any time.—Smith, *Farmers' Bulletin* 42, U. S. Department of Agriculture.

Even the surface of the soil when overloaded with sewage loses partially its power of purifying the organic matter. After sufficient rest, such an overloaded soil regains its original power. The purifying activity of the soil from a sanitary aspect is the same as that governing fertility from an agricultural standpoint, hence any further discussion of this subject is unnecessary.

A hint as to the proper disposition of waste, excrement, etc., is furnished by what is stated above concerning the purifying capacities of the earth's surface. Waste, night soil, etc., should be deposited with proper precautions on or immediately below the surface of the soil, where it may perform the double function of ridding the household of a nuisance and of enriching the soil itself. This leads us to a consideration of the best means of taking care of the household wastes. These are, in general, of three classes: First, fecal matter; second, kitchen and chamber slops; and third, miscellaneous rubbish and ashes.

NIGHT SOIL.

The proper disposition of fecal matter or night soil in the country has been one of the most pressing and vexatious problems of modern sanitation. Many plans have been suggested, much apparatus has been invented to

meet the difficulty, but opinions not only differ but change from year to year and have led to different practices in different countries. Moreover, different climatic conditions and the divergent tendencies of rural populations in the various sections of our own country make it impossible to apply the same scheme to the whole country. Different degrees of prosperity and wealth, even in the same locality, will bring into use widely different schemes to accomplish the same end. There are in use several systems:

The privy.—The old-fashioned privy, at present still quite a common thing even in cities, is, perhaps, the most favored method of disposing of fecal matter in the country. A pit is dug and a small building set over it. The excrement deposited in it slowly fills it up. The fluids and the solids dissolved by them penetrate the subsoil and diffuse themselves in the ground. Rarely is such a pit cleaned out. Another is dug and the old one covered up. In this way the ground becomes overloaded with refuse organic matter. It is even stated on good authority that such collections of fecal matter have been found under the dwelling; also, that the privy vaults have been dug until the current of ground water was reached which was to facilitate the removal of the excrement. It is difficult to conceive a more pernicious custom, or one more certain to pollute the drinking water. The privy vault is the most rudimentary way of getting rid of night soil, and its dangerous features are too plain to be referred to.

The cesspool.—Next comes the cesspool, which is usually connected with a water-closet, and may also receive the slops from the kitchen.

These are constructed in two ways, either as water-tight receptacles or as simple pervious pits differing in no way from the privy vault excepting, perhaps, in their more dangerous tendencies. All sanitary authorities agree in condemning the leaky cesspool as a most shiftless and dangerous method of getting rid of sewage. In most countries they are prohibited by law in populous communities. In exceptional cases, leaky cesspools may do no harm, as in an isolated house in the country whose cesspool is built at a considerable distance both from the house and the well. The safe distance from any well it would be difficult to state, because that would depend on the character of the subsoil and the general slope of the land. In any case, the cesspool should be on lower ground than the well, as the current of the ground water feeding the latter, usually, but not always, conforms to the slope of the surface. A fair estimate of the least allowable distance between well and cesspool would be 100 feet. Soluble salts from the sewage might still find their way into the well water, but it is quite improbable that disease germs could penetrate the soil for such a distance except where fissures and cracks may be present.

In villages leaky cesspools are still of frequent occurrence. If the drinking water is taken from wells, such cesspools are a constant menace, and all that is needed in many such towns is a spark in the shape of some disease germ to kindle an epidemic. It is true that years may pass by without the occurrence of more than the usual amount of illness, but even then we have good reason to suppose that in many villages using cesspools the average amount of sickness and mortality is far too high, not to mention the occasional epidemics of typhoid fever. We may sum up the matter of leaky cesspools by the statement that they may do no harm near isolated houses on farms, provided they are suffi-

ciently far away from the source of water supply. In small towns cesspools should be prohibited, or only very thoroughly constructed water-tight ones permitted, according to circumstances. The same holds true for the well-known privies.

The dry-earth closet.—The dry conservancy system is a much better method of disposal of excrement, and is extensively in use to-day even in certain large cities on the continent of Europe where sewers have not yet

been introduced. This consists in the main of the frequent removal of excreta in the country by some man servant or member of the family; in villages and towns according to some co-operative plan. This system has taken various directions, according to circumstances. Thus there are what is called the pail system, which consists in the daily or less frequent removal of a pail receiving the excreta; and the earth closet invented by the Rev. Henry Monle, of England, the chief feature of which consists in the covering of the excreta with some absorbent substance like dry earth or ashes. In some places the excreta are received into a well built brick or stone receptacle, covered with earth, from which they may be removed from time to time. Of these systems the dry-earth closet has received the greatest amount of attention and discussion. It consists, essentially, of a pail to

FIG. 2.—Portable earth closet. A, the pail to receive the excrement; B, the urine separating receptacle hanging on the open door; C, mouth of the hopper conveying the dry earth or ashes from reservoir D upon the night soil in A. Smith, Farmers' Bulletin 42, U. S. Department of Agriculture.

receive night soil, which is covered either automatically or with a scoop with dry earth (Fig. 2). The earth absorbs the fluids and the odors and keeps the closet inoffensive.

The earth to be used should be a rather fine loam, sifted to remove coarse particles, thoroughly dried by spreading out in the sun or under a shed, and then stored in barrels. The drier the earth the better it is. The finer the particles of earth the greater the capacity for absorbing fluids. For this reason sand is not satisfactory. Coal or wood ashes are quite satisfactory, as they are, after proper sifting, of the requisite fineness and are thoroughly dry. The mixture of earth and ashes and night soil should be removed at certain times, depending upon the location of the closet, the season of the year, and other conditions. The more frequent the removal the better. The mixture of soil and excrement is so unobjectionable that

It has been used over a number of times after being dried each time. This can not be recommended, however, as it is generally accepted nowadays that disease germs may remain alive in such a mixture for some time.

In place of the movable earth closets, a water-tight, concreted area may be built in an annex to the house, which is to receive the night soil from a closet on a floor above with the necessary quantity of dry soil. (See Fig. 4.) Poore, from whose book the illustration is taken, recommends, in addition, the construction of the floor of such a pit with an inclination sufficient to carry away the urine into some gutter outside filled with absorbent soil. The area should have suitable openings for inspection and for removal of

FIG. 3.—The old form of earth closet with frame and pail removed to show the mechanism. The handle on the left when raised throws into the pail a certain quantity of dry earth or ashes from the reservoir or hopper in the rear. Smith, *Farmers' Bulletin*, 48, U. S. Department of Agriculture.

contents, as well as for ventilation. Waring recommended a similar system many years ago. The closet described by him discharges into a water-tight vault in the cellar, which requires emptying only occasionally. The contents remain inoffensive, provided sufficient thoroughly dry earth is used.

In cold climates, indoor closets are especially desirable to obviate the exposure which can not be avoided when closets are out of doors. For invalids there should be a carefully managed earth closet kept in a well-aired room set apart for this purpose. In warm climates, earth closets should be frequently cleaned. To prevent the attraction of flies and insects and the too rapid decomposition of the contents a little unslacked lime added with the earth to the excrement will be of value. The discharges of persons suffering from typhoid fever and bowel troubles should be mixed with thin slacked lime¹ (milk of lime). One-half to one hour after the mix-

¹Lime, to be used for disinfection, should not be air-slacked, but kept in tightly covered receptacles to prevent this from taking place.

ing, such discharges may be put upon the soil, always at some distance from a well or spring, a stream, or a field under cultivation.

In Europe, the use of earth and ashes has been superseded by peat dust. The upper layer of peat is dried in the air and ground in a suitable machine. The coarser particles are removed by sifting and used for bedding in stables. The fine

portion, which has a very high absorbing power for fluids and is also capable of preventing odors, is used in dry closets. In Germany there are at present about thirty factories engaged in the preparation of peat moss for the purposes mentioned. Its great advantages over dry earth should bring it into use in our country. (See Fig. 5.)

It does not matter from a sanitary standpoint which one of the dry-earth systems is adopted, provided the necessary attention be given to it. Every system which can be recommended is bad if not properly attended to. The conditions to be observed are:

The night soil should be received in water-tight receptacles.

It should be frequently removed.

It should be utilized in the garden or field by being placed under a thin layer of soil.

To excreta from the sick, milk of lime or unslacked lime should be added before disposal in the soil.

The water closet.—There can be no doubt that to-day the water-carriage system,

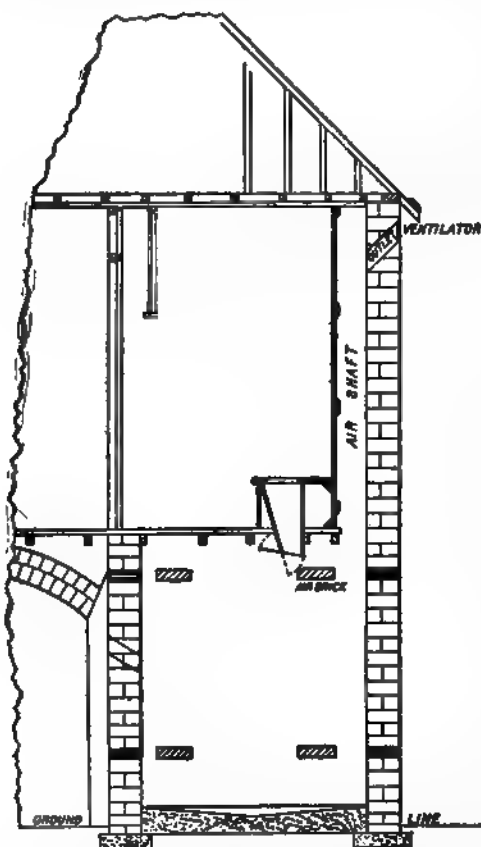


FIG 4.—Earth closet and dry catch (from Poore's "Rural hygiene," scale, $\frac{1}{4}$ inch equals one foot). To prevent drafts the earth closet is closed below by a hinged flap which opens and shuts automatically by means of a counterpoise. The catch below is provided with air bricks and an air shaft leading to a ventilator. Smith, Farmers' Bulletin 48, U.S. Department of Agriculture.

as it is called, or, in simpler language, the indoor water-closet, is preferred to all other contrivances. This is true for the open country as well as for villages and the suburban territories of cities. There is much to be said in favor of the present-day perfect contrivance for the rapid removal of excreta and the exposure thereby prevented. But for all rural



FIG. 4.—Self-acting peat dust closet. The lid is replaced by a hinged reservoir containing the peat dust. Whenever this is let down a certain quantity of peat dust is discharged automatically and thrown upon the night soil. (From Weyl's *Handbuch der Hygiene*. II, p. 315.) Smith, *Farmer's Bulletin* 42, U.S. Department of Agriculture.

inhabitants the cost should be carefully weighed before a water-carriage system is introduced into a house, for none but the best will answer, as all others are likely to become nuisances.

The supply of water must be sufficient to flush the water-closet thoroughly and keep all the pipes clean; the plumbing must conform to that in vogue in cities, with its traps and ventilating pipes to prevent the odors of the pipes from escaping into the house; and the disposal of the large quantity of liquid sewage, the most difficult problem, must be properly attended to or it is likely to prove more dangerous to the water supply than the old dry privy pits.

LIQUID SEWAGE.

The methods available to dispose of liquid sewage in the country are water-tight cesspools and irrigation.

Vaults.—Water-tight cesspools should be constructed of hard-burned brick, laid in cement, and having a similar brick or a concreted bottom. The inside and outside surfaces of the brick wall should be coated with a thin layer of cement, and clay rammed in around the wall, to increase its imperviousness to water. It should be vaulted above, and topped by a square or round central opening, covered with stone or iron plate. Cesspools are also made of cast or wrought iron, the joints being made water-tight. Cesspools must be ventilated by two pipes, one rising several feet above ground, the other carried to the roof of the house, barn, or other structure near by. The current will, in most cases, tend down the short and up the long pipe. The latter may be dispensed with and the soil pipe of the house act as a flue, provided all branches are perfectly trapped.

Irrigation.—The disposal of sewage by irrigation is by far the best method now within reach. Two methods are in use, viz., surface and sub-soil irrigation. The first in its most complete form consists in carrying the liquid sewage to a piece of ground set apart for the purpose and carefully underdrained. The sewage is allowed to flow over the ground in shallow channels. The fluid slowly disappears in the soil and enters the drains as comparatively pure water, which may be allowed to flow into a stream. For villages this is the best means of disposing of sewage. Those who as village officials may be interested in this method will find plans of such sewage farms, together with faithful accounts of their operation and the results obtained, in the annual report of the State Board of Health of Massachusetts

FIG. 5.—Settling chamber and flush tank for surface and subsurface irrigation of sewage. (From Gerhard's "The Disposal of Household Wastes," 1898.) Smith, Farmers' Bulletin 43, U. S. Department of Agriculture.

for 1892, page 559, and same report for 1893, page 563. Suggestions for its application to country houses are given further on.

For isolated rural homes, or village homes commanding a certain amount of ground around the house, the liquid sewage from water closets, the kitchen and chamber slops may be disposed of by the simple means of subsoil irrigation, first described by Mr. Moule and subsequently elaborated by Colonel Waring.

The system as used at present in its most successful form consists, outside of the house, of the following parts (see Fig. 5):

Two adjoining water-tight receptacles of brick. One of these receives the sewage from the house and is intended to act as a settling chamber for the coarser particles, paper, etc. This communicates with the second receptacle, which receives from it the fluid sewage. This chamber is called the flush tank and is provided with a siphon. When the fluid has reached a certain level, the siphon is set in operation and discharges the contents of the chamber at one time into the subsoil pipes.

From the second cistern a system of subsoil pipes laid over a treeless piece of ground, preferably a lawn, receives and discharges the sewage into the ground. These pipes should consist of porous tiles, two inches in diameter and about one foot long, laid from eight to sixteen inches beneath the surface of the ground, and with a gentle inclination of two or three inches for every 100 feet. The tiles should have open joints not less than one-fourth of an inch wide. They are laid upon earthen gutters and the joints are protected above by caps from being clogged with earth. The intermittent discharge of the liquid sewage is quite essential to the successful working of this system. If the sewage is allowed to dribble away into the pipes certain portions of these will become supersaturated with fluid and others will not receive any; the purification of the sewage in the soil is thereby rendered imperfect. The discharge of a large quantity of fluid at one time, besides scouring the system of pipes, fills it more uniformly and distributes the work to all parts of the subsoil system.

The successful construction of such a plant requires the services of some one familiar with it, and it is therefore not necessary for me to do more than call attention to it here as a highly recommended system for homes, especially in villages, where the proper amount of land is procurable and where the sewage must be disposed of in a manner both inoffensive and safe. In any case the soil of such land must be porous, not clayey and retentive. Those who wish to familiarize themselves with the details will find descriptions in the *Sanitary Engineer* for 1883, page 530, by Philbrick; in "The Disposal of Household Wastes," by Gerhard, and in "Sewerage and Land Drainage," by Waring. The entire plant is said to cost \$200 to \$300, the annual expenditures for cleaning, repairs, etc., about \$10.

The method of subsurface irrigation just described may be too complex and too expensive where land is abundant and neighboring houses at some distance. The simpler method of surface irrigation may be resorted to by laying out at some distance—at least 100 feet—from the house a small sew-

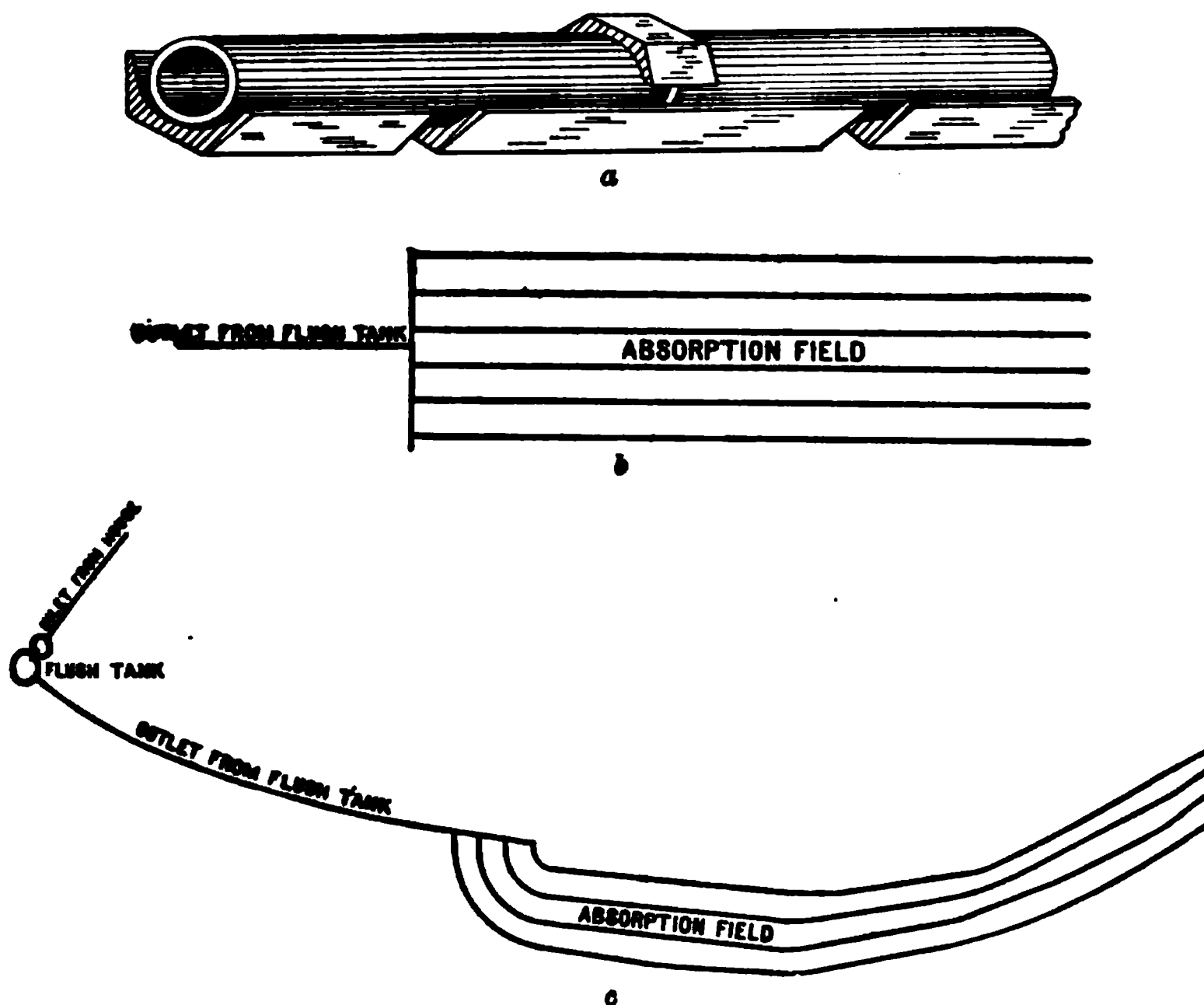


FIG. 7.—Subsurface irrigation of sewage; a, absorption tiles (from Gerhard's "The Disposal of Household Wastes"); b and c, lines of absorption tiles showing their relation to flush tank (from Waring's "Sewerage and Land Drainage").—Smith, *Farmers' Bulletin No. 43*, U. S. Department of Agriculture.

age farm where the sewage may flow in shallow trenches over the surface and slowly sink into the ground. Such an irrigation field must have the same qualities demanded by subsurface irrigation. Its surface should have sufficient slope and the soil should be porous, not retentive. The liquid sewage, including kitchen and chamber slops, is conducted to this field in a

water-tight tile drain and then allowed to flow into shallow trenches. To avoid the overloading of the soil with sewage at any one place the main distributing trench should be so arranged that it and the irrigating trenches branching from it may be temporarily blocked at any point to divert the sewage into one or more different trenches every day. In winter the warmth of the sewage will keep it in motion and the filtration will go on although the field may be covered with snow and ice. The use of the flush tank as described above would cause a more uniform distribution of the fluid over the field and make the filtration distinctly intermittent. The ground between the trenches may be cultivated to increase the amount of evaporation. If conveniently situated, an orchard may be used as the irrigating field. It should be distinctly understood, however, that marketable fruits and vegetables should not be carelessly allowed to come in contact with fresh sewage, nor should the irrigation field be near the well unless the latter is fairly deep and tubed or tilled to the surface of the water.

KITCHEN AND CHAMBER SLOPS.

The removal of kitchen and chamber slops is a matter which also requires proper attention, as this liquid frequently gives rise to unhealthy conditions, annoying alike to sight and smell when carelessly disposed of. The simplest way to utilize kitchen slops is to pour them upon plants about the house in summer, in winter upon the soil, each time in another spot, so as not to supersaturate the surface layers of soil in any one place. A means of less trouble recommended by Waring is to partly fill with soil a barrel with a leaky bottom and cover this with a layer of stable manure to prevent the puddling of the soil. The slops filter through the soil and leave the barrel below as a clear fluid. The barrel is emptied two or three times a year and the contents used for fertilizer.

House slops may be disposed of by surface irrigation or by subsoil pipes, as already described. The originator of this method, Mr. Moule, may here be profitably quoted as to its simplicity and success:

Where there is a garden the house slops and sink water may, in most cases, be made of great value and removed from the house without the least annoyance. The only requirement is that there shall be a gradual incline from the house to the garden. Let all the slops fall into a trapped sink, the drain from which to the garden shall be of glazed socket pipes well jointed, and emptying itself into a small tank, 18 inches deep, about a foot wide, and of such length as may be necessary. The surplus rain water from the roof may also enter this. Out of this tank lay 3-inch common drain pipes, 8 feet apart and 12 inches below the surface. Lay mortar at the top and bottom of the joints, leaving the sides open. If these pipes are extended to a considerable length, small tanks about 1 foot square and 18 inches deep must be sunk at about every 20 or 40 feet to allow for subsidence. These can be emptied as often as required, and the deposit may be either mixed with dry earth or be dug in at once as manure. The liquid oozes into the cultivated soil, and the result is something fabulous. * * *

On a wall 55 feet in length and 16 feet high a vine grows. A 3-inch pipe runs parallel with this at a distance of 6 feet from it for the entire length. The slops flow through this pipe as above described. On this vine year after year has been grown 400 well ripened bunches of grapes, some of the bunches weighing three-fourths of a pound. During a period of four years, for a certain purpose, the supply was cut off. To the surprise of the gardener scarcely any grapes during those years appeared; but afterwards the supply was restored, and the consequence was an abundant crop; the wood grew fully 16 feet, of good size and well ripened.

In place of an indoor sink, an upright tube or hopper may be constructed out of doors in communication with the sub-surface pipes into which the waste fluids are poured.

WASTE AND GARBAGE.

The attractiveness of a rural home depends largely upon the promptness with which all kinds of waste material are disposed of. The abundance of space around the house is a great temptation for the members of the household to use it as a place for storing rubbish and useless, worn-out things. Sifted ashes are easily utilized in earth closets and upon walks and roads, to make them compact and firm. Other articles of no use, such as broken crockery, bottles, tin cans, etc., can be thrown into depressions and gullies and covered over with earth, or else buried in trenches where subsoil drainage is desirable. The removal of rubbish is a very fruitful theme and might be dealt with at length. Its importance as related to health and disease is a subordinate one, and the reformer must appeal to the love of order, propriety, and beauty in and around the home in order to make an impression.

Garbage is of much less annoyance in the country than in the city, where its collection and destruction is a great expense, and is frequently very unsatisfactorily done. In the country, the household garbage is fed to the swine and poultry, and is in this way profitably used. There are, however, homes where garbage must be taken care of in other ways. It may be buried in the garden or else burned in the kitchen range. Recently a device has been patented which enables the housekeeper to place the garbage in a section of the smoke pipe of the range, where it dries out rapidly, burns and leaves only a little charcoal behind, which may be used for fuel next day. This device has been well recommended by sanitarians (see Fig. 8).

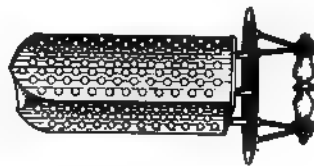


FIG. 8.—Garbage cremator. The garbage is placed in the perforated frame. The latter is pushed into the smoke pipe, where the garbage becomes slowly carbonized. Smith, *Farmers' Bulletin* 43, U. S. Department of Agriculture.

PROTECTION OF DRINKING WATER.

The next subject to claim our attention is the protection of the sources of drinking water. In the country water is, as a rule, obtained from wells and springs. The important bearing upon well water of soil purity demands a few explanatory remarks concerning the origin of well water. Wells are excavations made into the ground to a variable depth until water is reached. This water is denominated ground or subsoil water. Its origin may be better understood if, for the moment, we conceive the surface of the earth as more or less irregular and entirely impervious to water. The rain would collect on this surface and form lakes, ponds and streams, according to the configuration of the surface. If, now, we conceive this surface covered with sand or other porous earth to a greater or lesser height, and the top of this be considered the earth's actual surface, the water will remain in the same position, but it will be buried within and fill the pores of the overlying soil as subterranean lakes, ponds and streams. In digging a well we remove this porous layer of earth until we reach these subterranean streams or reservoirs of ground water. If the above description be thoroughly understood, the condition under which well water may be obtained at different depths will become intelligible, and it will also appear plain why ground water may flow as any surface stream and pick up on its way various substances which have percolated into the ground.

When the bed of porous soil overlying the impervious layers is very deep, wells will have to be dug down to a considerable depth to reach the surface of the ground water. Where this layer of pervious earth is of slight thickness wells will be shallow, and the ground water may appear on the bottom of gullies, trenches, and wherever the porous layer has been dug or washed away.

The movement of the ground water depends on the inclination or slope of the impervious strata, and has been observed to be quite rapid in some instances. By adding common salt to the water in a well its detection in other wells at a short distance has been found a guide in the determination of the rapidity and direction of the underground current.

When the ground water resting on the uppermost impervious layers is near the surface, and therefore not safe or fit to use as drinking water, it may be possible by digging below this layer to find another porous bed containing water. This source will, in general, be much purer since it is less exposed to pollution from above, and since the water has to travel longer distances underground. Such a deep supply must, however, be protected from the superficial supply by a water-tight wall extending to the surface of the deep supply, otherwise the water from the upper layers will simply drain into the well.

WAYS OF CONTAMINATION.

Wells are exposed to contamination in two ways. The surface water from rain, house slops, and barnyard drainage may find its way into the well at or near the surface of the ground. Or the ground-water stream supplying the well with water may in its subterranean movements encounter cesspools or seepings from cesspools, and carry with it soluble and suspended particles, some of which may enter the well. There can be no doubt that a large percentage of the wells are exposed to contamination

with refuse matter in the manner described; and it now remains to gauge the danger to health and life which may be carried in the contaminating substance. The danger of typhoid-fever bacteria entering the water has already been mentioned. These may be washed in from the surface or they may pass from cesspools near by through fissures in the ground, passages dug by rats, etc. Whether such bacteria can pass through the pores of a compact, unbroken soil from a cesspool to a well near it is a matter not fully settled. Since, however, the actual condition of the deeper layers of the soil between cesspool and well can not be known, it becomes imperative to prevent all pollution of the ground-water current supplying wells by either abolishing the cesspools or else placing them at a considerable distance from all sources of water.

Beside typhoid-fever bacteria, those organisms which cause digestive disturbances, and severer troubles, such as diarrhoea, dysentery, and possibly other unknown diseases, may be carried into well water. During cholera epidemics, polluted wells might form centers of infection. Eggs of animal parasites may be washed in from the surface. Again, the barnyard manure, representing the mixed excrement of various animals, may under certain conditions be bearers of disease germs, and such excrement should, under no conditions, be looked upon as entirely harmless to human beings *

Besides the protection of the ground water near the well from pollution emanating from cesspools, etc., the surface of the ground about the well should be kept free from manure, slops, and other waste water; hence the well should not be dug under or close by the house,† nor should it be located in the barnyard, where the ground is usually saturated with manure. It should be surrounded by turf, and not by richly manured, cultivated, or irrigated soil. The ground immediately around it should slope gently away from it and be paved if possible. The waste water from the well should not be allowed to soak into the ground, but should be collected in water-tight receptacles or else conducted at least twenty-five feet away in open or closed channels which are water-tight.

CONSTRUCTION OF WELLS.

The well itself must be so constructed that impurities can not get into it from above or from the sides. If water can soak into it after passing through a few feet of soil only, it can not be regarded as secure from pollution. To prevent this, the well may be provided with a water-tight wall built of hard-burned brick and cement down to the water level. The outside surface of this wall should be covered with a thin layer of cement, and clay pounded and puddled in around it. Or, tile may be used to line the well and the joints made water-tight with cement down to the water level. Driven wells, i. e., wells constructed of iron tubing driven into the ground, are, perhaps, the safest where the quantity of water needed is not large and where other conditions are favorable.

These different devices are all designed to keep water near the surface of the soil from percolating into the well. To keep impurities from enter-

* It is probable that the filth which gets into cow's milk and which appears to be mainly excrement of cows is largely responsible for the severe summer diseases of infants fed on cow's milk.

† The water may be carried into the kitchen by running the pipe from the well, horizontally, under ground.

ing the well directly from the top considerable care is necessary. Such impurities are likely to prove the most dangerous because there is no earth filter to hold them back and destroy them before they can reach the water. Adequate protection above may be provided in several ways. The sides of the tiled wells should project above the surface and be securely covered with a water-tight lid. The ordinary well should also have its sides project above the surface and a water-tight cover of heavy planks provided, which should not be disturbed excepting for repairing or cleansing the well. Under no circumstances should objects be let down into the well to cool. A still better method of protecting the water from above is to have the lining wall of the well end three feet below the surface of the ground and to be topped there with a vaulted roof, closed in the center with a removable iron or stone plate. The top should be covered with twelve inches of clay or loam; above this there should be a layer of sand, and lastly a pavement sloping away in all directions.

Too much care can not be bestowed upon the household well. It should be guarded jealously and all means applied to put the water above any suspicion of being impure. This is especially true in dairies where well water is used in cleaning the milk cans, and where steam and boiling water have not yet found their way for this end. Polluted wells in such houses not only endanger the health of the inmates but that of a more or less numerous body of city customers.

In those regions where rain water is the only safe drinking water, the same care is necessary to protect the stored supply from contamination, and no suggestions beyond those already given are necessary here.

CONCLUSION.

In the foregoing pages it has been the aim of the writer to give a few facts and supply a certain number of ideas which, in the mind of any person who has thoroughly understood them and who thinks for himself, may be safely left to ripen into schemes adapted to his own wants and surroundings. How many resources a man armed with correct views may find in the simplest appliances the reader may judge for himself by consulting chapters IX, X, and XI of Dr. Vivian Poore's very interesting volume on rural hygiene. Whether the means for utilizing household wastes there described and adopted by him would be adequate outside of a limited territory of our own country, I am not prepared to state. For the same reason no definite suggestions can be made in these pages, owing to the wide diversity in the climatic and other conditions obtaining over the vast territory of our country. The writer has, furthermore, omitted all statements of detail which properly belong to the sanitary engineer. The works referred to will, however, supply those more directly interested with the facts and figures desired.

The principles to be kept in the foreground are the disposal of sewage in the superficial layers of the soil in not too great quantity, the disinfection of the stools of the sick with lime before such disposition is made, the digging of wells in places kept permanently in grass and at some distance from barnyards, and, above all, their thorough protection from contamination from the surface and from the soil immediately below the surface.

In every community there are public spirited citizens who could do much good by taking hold of the simplest and safest methods of disposing of sewage and refuse, putting them into practice, and showing the rest of the community just what good can be accomplished and what harm avoided by a little continuous attention to sanitary matters. In this way many may be led to undertake improvements who, with no definite knowledge of the expense involved and with misgivings as to the final success of the undertaking, would otherwise hesitate to make a beginning.

Circulars

AND

Rules and Regulations

ADOPTED BY THE

State Board of Health.

XXXIII.

CIRCULAR NO. 1.

QUARANTINE AND DISINFECTION.

RULES AND REGULATIONS.

CONTAGIOUS DISEASES.

RULE 1. It shall be the duty of every physician residing or practicing within the limits of any city, town or township to give written notice to the mayor, or township clerk (as the case may be) of any case of Asiatic cholera, smallpox, diphtheria (membranous croup), scarlet fever (scarlatina, scarlet rash), typhoid fever, measles, whooping cough, leprosy, or puerperal fever, that he may be called to attend professionally, within twenty-four hours after he shall first visit and ascertain the character of any such disease named herein. In all cases where no physician is in attendance, it shall be the duty of any person having charge of, or being at the head of any family, or having the care or custody of any lodging rooms to give notice in like manner as required of physicians. Every school teacher and school officer who discovers, or who has knowledge of a case of these contagious diseases, shall cause the fact to be immediately reported to the mayor, or clerk of a township.

RULE 2. It shall be the duty of the mayor or township clerk (as the case may be), upon receiving written notice of the existence of a case of Asiatic cholera, smallpox, diphtheria (membranous croup), scarlet fever (scarlatina or scarlet rash), to forthwith quarantine the premises, by serving written notice to the occupants thereof, and placing a danger card thereon; and take such measures as may be necessary and proper for the restriction and suppression of such disease; and to investigate all the circumstances attendant upon the occurrence of the same. He shall also make proper provision for care of the sick. Where the disease is measles or whooping cough, the premises shall not be quarantined, but they shall be placarded with the danger card.

And it shall be the further duty of the mayor or township clerk (as the case may be) to disinfect or cause to be disinfected, the premises whereon such quarantined diseases have occurred, together with all infected furniture, bedding, clothing and other articles, as provided by regulations of the State Board of Health.

RULE 3. If any person shall wilfully or maliciously remove or deface, or cause to be removed or defaced, any signal of danger, or cloth or card placed upon the quarantined premises, without the proper authority as provided herein, he shall be prosecuted, as provided by law.

RULE 4. During the existence of any contagious or infectious disease, in any family or household, or place, in any city, town or township, and until after the recovery of the sick and the disinfection of the premises where such disease shall have existed, no person residing in such household, family or place, shall be permitted to attend any public meeting, and no superintendent, teacher or officer of any school shall permit any child or person from any such family, household or place to attend any school without a permit from the mayor or township clerk (as the case may be), upon the recommendation of the attending physician, showing thorough disinfection of the person, clothing and premises. School teachers, who are boarding in a family in which a contagious disease exists, must at once change their place of boarding and lodging, and change and disinfect their clothing.

QUARANTINE.

RULE 5. Quarantine shall be deemed to be:

First.—The serving of a written notice upon the family, and the placing upon such conspicuous place, on each building, hall, lodging room, or place wherein exists a contagious disease, as will best protect the public health, a cloth or card not less than eighteen inches square, having imprinted thereon in large letters the word "Quarantine," the name of the disease, and the words: "No person shall be permitted to enter or leave these premises except as provided by law, while it is quarantined, under the penalty provided by law."

Second.—Separation of the sick from all persons except those in actual attendance.

Third.—That no person shall leave said premises except the attending physician, without a permit therefor signed by the mayor or township clerk (as the case may be).

Fourth.—That no article that has been used on or about a person sick with a contagious or infectious disease shall be removed from the sick room, or from the premises, until the same has been properly disinfected.

RULE 6. Nurses who have been employed to care for persons sick with contagious disease may be released from quarantine when their services are no longer required, upon the order of the mayor, or township clerk (as the case may be). Before leaving the premises there must be thorough disinfection of their person and clothing.

RULE 7. Isolation means the complete exclusion of all other persons from the sick except the nurse and attending physician; that the nurse shall be restrained from going to and from the premises, or mingling with the family; that all well persons shall be prevented from contact with bedding, clothing, food, or other articles that have been used on or about the sick. Where from necessity the parents or family are nurses, the isolation and quarantine applies to them.

RULE 8. Quarantine shall be established and maintained in each and every case for the period named herein, to-wit:

Scarlet Fever.—(Scarlatina, scarlet rash), thirty-five days.

Diphtheria.—(Membraneous croup), thirty-five days.

Smallpox.—Forty days.

Asiatic cholera.—Twenty-one days.

RULE 9. When a family is quarantined for diphtheria, the head of the family, or bread-winner, may at the discretion of the local board, have the privilege of attending to his regular business, and of going to and from his house only when complying with the following conditions, and the mayor or township clerk (as the case may be) shall issue a permit therefor:

First.—He shall change his clothing before going to and leaving his home to go to his place of business.

Second.—He shall wash his hands, face, head and beard with a two per cent solution of carbolic acid each time before leaving his home to go to his place of business.

Third.—While in the house he shall not act as nurse nor live in the same room with the sick person.

Fourth.—He shall not attend any public meeting, nor attend any place where persons are congregated.

Fifth.—This privilege shall not be granted to school teachers, nor to any person whose business brings him in intimate contact with children.

RULE 10. Whenever there is complete recovery or death of persons who have been sick with a contagious disease, and there are no further exposures thereto, the quarantine may be released, although the period prescribed herein has not elapsed. *Provided*, that no release of quarantine shall be permitted until at least seventeen days after the recovery or death of the last case, and proper disinfection of person and premises is made as hereinafter provided.

RULE 11. After death or recovery of persons sick from a contagious or infectious disease, the room, furniture and other contents not to be destroyed, shall be thoroughly disinfected in accordance with regulations made by the State Board of Health.

RULE 12. No order for the release of quarantine shall be made by the mayor or township clerk (as the case may be), except upon a report from the attending physician stating the number of persons on the quarantined premises sick with the infectious disease in question, their names, ages, and when the disease first appeared in each case, when recovered, and the means, if any, used for disinfection. If the mayor, or township clerk (as the case may be), shall find that the regulations of the local board and of the State Board of Health respecting quarantine and disinfection have been complied with the quarantine shall be forthwith released. If quarantine regulations have been complied with, and proper disinfection has not been done, the mayor or township clerk (as the case may be), shall order it done under the supervision of the health officer or some other competent person, and the quarantine shall be continued until it is done.

RULE 13. No person shall give, lend or sell, or offer for sale, any clothing or other articles liable to convey infection of any contagious disease unless the same have been disinfected and such disinfection approved by the mayor or township clerk (as the case may be).

RULE 14. When Asiatic cholera, smallpox, diphtheria (membraneous croup), scarlet fever (scarlatina, scarlet rash), typhoid fever, leprosy,

measles, puerperal fever; or any contagious disease exists in any house or dwelling place of a dealer in, or seller of, milk he shall discontinue to give, sell, or distribute milk to any person, or to creameries or butter factories, or in anywise handle such milk, until a permit is granted therefor by the mayor or township clerk (as the case may be), countersigned by the health officer. And no person who attends cows, and does the milking, or who has care of milk vessels, or the sale or distribution of milk, shall be permitted to enter any premises or place wherein exists any of the diseases named herein, nor have any communication, direct or indirect, with any person who resides in, or is an occupant of such infected place; nor shall any milk or butter be given away, sold or distributed from such infected place. Any person, either as principal, agent or employee, who shall violate any of the provisions of this rule shall be prosecuted according to law.

CARE OF THE SICK.

RULE 15. A flannel cloth, wrung out of a strong solution of carbolic acid, should be hung constantly across the door leading into the room in which one sick with either disease specified in Rule 2 is placed.

RULE 16. The discharges from the throat, nose and mouth are extremely dangerous, and those from the skin, eyes, ears, kidneys and bowels are also dangerous, and remain so for a considerable time. Small pieces of rags should be substituted for handkerchiefs, and after having been once used must be burned immediately.

RULE 17. The discharges from the patient's bowels or bladder must be received into vessels containing a solution of corrosive sublimate (which, being a deadly poison, should be so labeled as to avoid accidents); or a strong solution of carbolic acid or some other disinfectant, and if not buried at once must be thrown into a cesspool or water closet after having been thoroughly disinfected, but never into a running stream. If buried, it must not be within one hundred feet of any well. All vessels must be kept scrupulously clean and disinfected.

RULE 18. Nurses and attendants must keep themselves and their patients as clean as possible—their own hands frequently washed and disinfected by carbolic acid solution.

The nurses must be few as possible, and they must not unnecessarily communicate with other persons. They must wear only such clothes as may be readily washed, which, when removed, must be placed immediately in boiling water and boiled at least thirty minutes. Neither they, nor any other person, should eat anything in the sick room, or which has been there. Gargling, or washing the mouth occasionally with a cleansing fluid, is recommended for those exposed to the contagium of the disease.

RULE 19. Food left uneaten by the sick must never be carried where it will infect other persons. It must be burned immediately on removal from the sick room, and the dishes used washed in boiling water, by themselves—never with other dishes.

SMALLPOX.

Vaccination is the only preventive for smallpox. Hence it is important that the vaccination be thoroughly done, with reliable lymph, free from all impurities, and with sufficient frequency.

Immediate vaccination after exposure is important for safety. It should be done, if possible, within five days after exposure.

Every infant should be vaccinated within three months after its birth, unless an educated physician advises to the contrary. Should the first attempt fail, it should be repeated at intervals of a fortnight until a true sore is produced.

Every child should be re-vaccinated before it reaches its *twelfth year*.

DIPHTHERIA.

Diphtheria is a most formidable disease, is widely prevalent, and one of the most fatal diseases in this State. It is produced by a specific bacillus which by multiplication produces blood poisoning. It attacks persons of all classes and ages, but most frequently children under sixteen years of age.

In ordinary cases the germ producing diphtheria probably attacks the person by way of the mouth and the air passages.

The period of incubation of diphtheria, or the time from a person's exposure to the disease to his coming down with it, like scarlet fever, varies somewhat—being usually from a few hours to seven or eight days; in some cases it is twelve or fourteen days.

It has been conclusively demonstrated that the germs of diphtheria retain their vitality in dried dust for an indefinite period of time, and that cold—even to freezing, does not affect its vitality. Hence the importance of destroying by burning or thorough disinfection all the discharges.

Its most frequent local manifestations are in the mouth, throat and air passages. When in the mouth, or upper part of the throat only, the disease is, as a rule, less dangerous and fatal, but none the less contagious, than when in the air passages, below the fauces.

Avoid exposure to the disease.

Observe rigidly every measure as given for scarlet fever.

Beware of crowded assemblies in ill-ventilated rooms.

All influences which depress the vital powers and vitiate the fluids of the body tend to promote the development and spread of this disease. among these influences, perhaps the most common and powerful are *impure air and impure water*.

RULE 20. Membranous croup must be treated as contagious, and be considered for all sanitary purposes as identical with diphtheria, and all rules applying to the latter apply equally to membranous croup.

SCARLET FEVER.

Scarlet fever is one of the most contagious diseases. One attack does not always prevent subsequent attacks. The greatest number of deaths from this disease is of children under ten years of age. Adult persons do sometimes have the disease.

Scarlatina and scarlet rash are identical with scarlet fever—equally dangerous and equally contagious. They are one and the same disease.

Avoid the special contagium of the disease. This is especially important to be observed by children. Children under ten years of age are in much greater danger of death from scarlet fever than are adults, but adult persons often get and spread the disease, and sometimes die from it. Mild

cases in adults may thus cause fatal cases among children. Because of these facts it is dangerous for children to go where adult persons go with almost perfect safety to themselves.

It is probable that the contagium of scarlet fever may retain its virulence for some time and be carried for a long distance in various substances and articles in which it may have found lodgment.

MEASLES.

RULE 21. Measles is a highly contagious and often fatal disease, hence is dangerous to the public health, but is not subject to quarantine regulations.

RULE 22. A danger signal must be placed upon the premises in some conspicuous place; all children of the family must be restricted to the home, and all other children excluded.

The specific poison or contagion of measles is in the rash which invades the membranes of the nose, throat, lungs and bowels, before, and often more severely than it invades the skin, so that it is contagious before the eruption appears on the skin.

This disease comes on like what is commonly called "a cold in the head," eyes watery and red; sensitive to light; watery discharge from the nose; fever; hoarse, dry, husky and painful cough; an eruption in the roof of the mouth, with or without sore throat. The eruption does not appear before the second or third day—first on the forehead and face—is in patches, and of dull red color; and the skin has a roughened feel to the touch.

Mothers can do more than all others to prevent the spread of the disease because they see the first symptoms and can promptly send the child to bed and isolate it until the true nature of the disease is determined. This early action, a hot bath, and a few days' rest and quiet will promote the safety and recovery of the sick, and also the safety of the other children of the family. In no one of the contagious diseases can the mother give greater aid, and in none is her co-operation more desirable.

WHOOPING COUGH.

Whooping cough is a contagious disease. School children affected with it must be excluded from the schools until entire recovery, and should be isolated from all other children. The premises must be placarded as provided in Rule 2.

TYPHOID FEVER.

It is the opinion of the best and most experienced sanitarians that typhoid fever is a disease which need not exist. That it is the result of a specific germ. That it is a filth disease—not that it is alone produced by filth. There must be a specific germ, and this germ must, through the mouth, as food or drink, enter the small intestines, where it multiplies enormously, and is thrown off in the excreta, to again multiply under the favoring conditions of moisture and heat. Hence the disposal of the excreta of a typhoid fever patient is of the highest importance. The most dangerous source of infection is from water. The discharges are thrown into a privy vault, on a manure pile, or on the ground, whence they sink into the earth, through the soil, and often contaminate neighboring wells.

There are many other ways in which water may be contaminated. The soiled clothing of a patient is washed and the water thrown upon the earth near a well, or poured into a leaky drain. Some kinds of food are very absorbent of disease germs. The most notable is milk, which becomes contaminated by being kept too near a patient. Several instances are known where milkmen have carried the germs of this disease in milk kept where the sick were, or by rinsing their cans with contaminated water.

The disease is not considered contagious in the sense that smallpox, measles, scarlet fever, and diphtheria are, yet it has been practically demonstrated that the germs may enter the system through the respiratory tract, as sewer air. Attendants upon those sick are not in danger from contracting the disease directly from the patient. It goes through families because every individual, usually, has been exposed to the producing cause—the disease germs—first through contaminated water or food, then the house surroundings.

Protect the water supply from any possible source of contamination. The water supply of cities and towns should be procured from sources where there can be no contamination, immediate or remote, from privies, cess-pools, stables or cemeteries.

Great care should be had to prevent the contamination of the water supply by discharges from the bowels of a person sick with typhoid fever, as by drainage into wells, springs, streams or other water supply, from a privy vault, sewer, drain or cemetery. Privies often drain into wells, unsuspected by those who use the water. Should typhoid discharges pass into such a privy an outbreak of typhoid fever among those using the water from a neighboring well would be likely to occur. If such a well were the source of the general water supply of a city, typhoid fever might soon be epidemic there.

There is good reason to suspect the water of a well whenever a vault is situated within less than a hundred feet of it, particularly if the soil be porous. In numerous instances fluids from excreta have leached into wells from much greater distances; and it has been proved that a well thirty rods from a cemetery received water which had filtered through the soil of the cemetery.

The use of water from a source likely to be infected with excreta from a typhoid fever patient should be promptly stopped. Great care should also be given to the milk supply.

Dangerously contaminated water may be, and often is, found to be clear and colorless, and to have no bad taste.

Keep the premises pure and clean as possible. Of all forms of filth none are so dangerous to houses as the "hole-in-the-ground" privy, and the sink-drains.

All discharges from the patient should be received in a vessel containing a pint or more of a solution of chloride of lime (six ounces of lime to one gallon of water), and kept covered three or four hours, and then buried in the earth, at such distance from wells, springs or streams that they cannot possibly be drained therein. Never mingle them with any kind of filth, in a privy or elsewhere.

All soiled clothing and bedding soiled with discharges from the patient should be at once removed and placed in a tub and completely covered with

solution of chloride of lime or other reliable disinfectant, and kept there until they can be boiled, or put in boiling water as soon as removed from the patient. It is important this should be closely observed, otherwise the substance on the clothing dries, becomes dust, floats in the air and endangers the attendants. It is probable that in this way washer women often become infected and have typhoid fever. After this disinfection the clothing may be washed with safety.

During sickness, disinfect at once carefully any spots on floor, carpet or rug accidentally soiled.

There is no necessity for burning the clothing, bedding and bed of a typhoid fever patient even when death occurs, nor for a private funeral, but the coffin must not be opened in any church, hall, place of public assembly or residence.

Strict isolation of the sick is not necessary, but it is wise, for all who can properly do so, to keep away.

After death or recovery, disinfect the sick room with sulphur fumigation and then wash the floors and woodwork with solution of corrosive sublimate or carbolic acid.

Nurses and others in the family should eat nothing in the room where the patient is, nor of anything that has been there. The food for the family and attendants should be prepared and kept as far as possible from the sick. As boiling will kill all disease germs, it is safer when the disease is in a house, to boil all water and milk just before using.

PUERPERAL FEVER.

Puerperal fever is a fearfully fatal disease. Hence, every attendant upon cases of labor should, by the use of antiseptic measures, sedulously guard against the occurrence of the disease. The hands and all instruments and appliances should be thoroughly disinfected, and all discharges subject to decomposition, and capable of producing septicaemia, should be promptly removed and destroyed. The only way to avoid this terrible disease is for every practitioner to recognize his personal responsibility in the matter, and he who does not is guilty of criminal negligence.

LEPROSY.

Persons afflicted with well developed leprosy should be required by all local health boards to remain on their own premises, and should not be permitted to mingle with the general public.

TUBERCULOSIS—CONSUMPTION.

This is an infectious and therefore a communicable disease, due to a germ—the bacillus tuberculosis. The disease is propagated and disseminated by infected meat and milk, and especially by the excretions and sputum of persons affected by it.

Infection.—It has been shown that the expired air is not infective. Cornet has said, "The consumptive, in himself, is almost harmless, and only becomes harmful through bad habits." The virus is largely contained in the sputum, which, when dry, is disseminated in the form of dust, and constitutes the great medium for the transmission of the disease. In the last stages of consumption, the patient is weak, the sputum is expelled

improperly; pillows, sheets, handkerchiefs, etc., are soiled. If a male, the beard or moustache is smeared. Even in the hands of the cleanly, without especial precautions, such circumstances all tend to the production, around the patient, of a halo of infected dust, maintained by every process of bed making or cleaning, which includes the pernicious habit of "dusting." In the hands of the careless and dirty, the infectivity is, of course, greatly aggravated.

It attains its maximum of intensity where the filthy habit of spitting on the floor prevails, especially if it is carpeted.

All rooms frequented by persons suffering from tuberculosis very soon become infected, and consequently dangerous, such as hospitals, jails, poor-houses, etc.; all such rooms where ventilation and disinfection are neglected are very dangerous, as proven by the great number of deaths of those who are confined in these poisoned abodes. Boats and cars on our great lines of travel, without great care being used, become veritable pest houses.

MEANS OF PREVENTION.—*Sunlight* is one of the most powerful agents in destroying the tubercle bacilli. Avoid imperfectly ventilated dwellings, dark, damp, musty rooms. Let your dwellings be light, dry and well ventilated, with an abundance of sunlight. The *sputum* should always be kept moist. In all public places, spittoons, partly filled with water, to which may be added some disinfectant, such as carbolic acid, or a two-per-cent solution of formaldehyde, should be freely distributed, and which all persons who spit should be required to use, if necessary.

Spitting in the streets and in all public places should be prohibited. No child should even be allowed to sleep with a person suffering from tuberculosis, especially if of the pulmonary variety.

Persons suffering from tuberculosis should not drink out of the same cup used by other members of the family, and when traveling should carry his own cup, as the microbes will adhere to the cup in great numbers, and thus endanger others.

As most cities obtain their *water supply* from rivers, whose waters are contaminated with sewage, all water for drinking purposes should be boiled before using, thus preventing typhoid fever, as well as tuberculosis. All *soiled clothing* from tuberculous patients should be thrown into a tub of water, to which some disinfectant has been added, preventing the *sputum* from drying, and thus protecting the washerwoman, as well as all others exposed.

Quarantining those affected, and placarding the premises, are not required in this disease; nor are public funerals prohibited.

THE DEAD.

RULE 24. A body dead from smallpox must be immediately wrapped in a cloth saturated with the strongest disinfectant solution, without previous washing, and cremated or buried deep, and no body dead from this disease shall under any circumstances, or any lapse of time, be disinterred.

RULE 25. The body of a person who has died from Asiatic cholera, yellow fever, leprosy, diphtheria (membraneous croup), scarlet fever (scarlatina or scarlet rash), must not be removed from the sick room until it has been wrapped in a cloth saturated with a solution of Corrosive sublimate (one ounce to six gallons of water), and then tightly enclosed in a

coffin. The body shall then be cremated or buried immediately without the attendance of any person other than is necessary for the interment thereof, provided that bodies dead from diphtheria, scarlet fever, and puerperal fever, if prepared in accordance with the rules adopted by this Board for the transportation of corpses by embalmers holding a license as such from the State Board of Health, may be deposited in a vault or be shipped by a public conveyance.

RULE 26. No public funeral¹ shall be held by any person who has died from either of said diseases named in Rules 24 and 25, and no public funeral shall be held in a house, nor on any premises where there is a case of, nor where a death has recently occurred from, either of said diseases.

RULE 27. No person, company, corporation or association having charge of, or control of any schoolhouse or church, or of any building, room or place used for school or church purposes, or for any public assembly, shall permit the body of any person dead from any of the contagious or infectious diseases named in these regulations, or any other dangerous contagious disease, except typhoid fever, to be taken into such schoolhouse, church, building, room or place, for the purpose of holding funeral service over such body; and no sexton, undertaker or other person having charge of or direction of the burial of any body dead from any of the said diseases, shall permit the coffin or casket containing such body to be opened; nor shall any child be permitted to act as pallbearer or carrier at any such funeral.

BURIALS.

RULE 28. Upon the death of any person within the limits of a city, town or township, it shall be the duty of the physician who was attending at the time of death, or of the coroner, when the case comes under his official jurisdiction, to furnish within twenty-four hours after such death, to the undertaker, or other person superintending the burial of said decedent, a certificate setting forth the full name, age, sex, color, place of death, date and cause of death, and such other facts as may be required by regulations of the State Board of Health and the statutes of the State of Iowa. If any person shall die without a physician in attendance, it shall be the duty of the undertaker, or of any person acquainted with the facts, to report the same to the health officer of the local board of health, who is hereby authorized to give a certificate of death as aforesaid, *provided*, it be not a case requiring the attendance of a coroner.

RULE 29. No sexton or other person or persons having charge or control of any cemetery, burying place, or tomb, or vault, and no undertaker, or other person or persons, shall inter, entomb, or place in any vault, the dead body of any person, or remove such body from or out of any city, town or township without having procured a certificate of death as provided in Rule 28; and it shall be the duty of any undertaker, or other person or persons having charge of the burial or removal of the dead body of any person

¹ A "public funeral" is deemed to be the indiscriminate attendance of persons not immediately connected with the family of the deceased person, *especially children*; the carrying of a dead body to a church or other public building; or exposure thereof to the public at any place, preceding or during the funeral service. In other words, there must be *none* present except those absolutely necessary to prepare the body for interment or inter it.

to deliver said certificate of death forthwith to the clerk of the local board of health.

RULE 30. It shall be the duty of the clerk of a local board of health upon the presentation of a certificate of death, to issue a permit to inter, entomb, or place in a vault the body of the deceased person named in such certificate. *Provided* a body dead from smallpox, Asiatic cholera, leprosy, yellow fever, typhus fever or bubonic plague, shall not be deposited in a receiving vault.

RULE 31. If any physician, or any other person, shall knowingly attempt to secrete, or withhold the true character of any of the contagious or infectious diseases specified in these regulations, or shall in any manner whatsoever attempt to deceive or defraud, or who shall make any false statement in making a certificate of cause of death by giving any other than the true cause of such death; or, if the decedent was affected with any such contagious or infectious disease during his last sickness, he shall neglect or refuse to state such fact in such certificate, he shall be liable to the penalty prescribed in section 2573 of the code.

RULE 32. Upon the presentation of the proper application in accordance with the regulations made by the State Board of Health for the removal of the dead body of a human being out of the limits of the city, town or township, it shall be the duty of the clerk of the local board of health to issue a permit countersigned by the president of the board or mayor (as the case may be) for such removal. *Provided*, that where said body is to be disinterred such application must be accompanied with a disinterment permit from the State Board of Health, but no permit for such removal shall be granted in any case of a body dead from Asiatic cholera, smallpox, leprosy, yellow fever, typhus fever or bubonic plague, or from any sequelæ or complications of such diseases. Bodies dead from diphtheria (membranous croup), scarlet fever (scarlatina, scarlet rash), may be disinterred only upon a special permit issued by the State Board of Health. No permit for such removal shall be granted in any case whatsoever where the cause of death was a contagious or infectious disease, or any sequelæ of such disease, unless the permit be approved and signed by the president of the local board of health, and also approved by the health officer, nor shall a permit be granted except upon the presentation of the proper certificate of the cause of death.

DISINFECTION.

As a result of patient and prolonged investigation two simple means have been determined upon which, if faithfully carried out, would soon rid the world of infections and contagions which, if not checked, become epidemic in character and frightful in mortality. These "means" are quarantine, or isolation of the sick and their nurses, and thorough disinfection — "the former means to let the matured disease die out, and the latter to kill the new germs before they can develop fresh mischief." To these means should be added in the case of smallpox, and perhaps some other communicable diseases, vaccination or inoculation.

It is important, first, to know what parts of the body are the favorite breeding places of the germs or micro-organisms that are the cause of infectious diseases and what parts give them off most freely.

As a result of observation and experiment it has been found that—

In cholera they are most numerous in the discharge from the bowels.

Consumption, in the expectoration from the lungs.

Diphtheria (membranous croup), in discharges from mouth, throat, and nose.

Measles, in the air passages and skin.

Puerperal fever, in the discharges of the reproductive organs.

Scarlet fever, in the discharges from mouth, throat and nose, and particles from the skin.

Smallpox and varioloid, in the pustules of the body.

Typhoid fever, in the discharges from the bowels.

Whooping cough, in the air passages.

From these sources they get into our bodies by means of the food we eat, the water we drink, the air we breathe, or through broken surfaces of the skin and mucous membranes. Many of these germs are very tenacious of life, and under favoring conditions multiply with wonderful rapidity.

Freezing or drying destroys but few of them—boiling or burning kills them all.

It is important, as well as interesting also, to know, at least approximately, how long the infection lasts in given cases. The following shows the average period of such infection:

Cholera, until complete recovery from the vomiting and purging.

Consumption, as long as the tubercular bacilli are found in the sputa.

Diphtheria, at least three weeks after nose and throat are well.

Measles, from three days before eruption until scurfiness has gone—two to four weeks.

Scarlet fever, from five to six weeks, until the throat is well and desquamation (peeling off) has ceased.

Smallpox, from four to eight weeks, until all the scabs have fallen off.

Typhoid fever, from five to seven weeks, until the fever has disappeared and the diarrhoea relieved.

Whooping cough, until the "whoop" is gone—from four to six weeks.

The following illustrate some of the best known and most reliable methods of caring for those sick with infectious diseases and of destroying the disease-producing germs:

CLEANLINESS.

A careful inspection of the premises, inside and out, should be made, including the cellar, well and outhouses, not only with a view of ascertaining the breeding places of the disease germs, but for the purpose of destroying everything that is a menace to health. Cleanliness of dwellings, closets, cupboards, privies, alleys, person, clothing, and bedding should be enjoined and enforced. Carpets, dirty and dust-laden, and successive layers of paper on the walls, especially when partially detached, form most excellent receptacles for preservation of these disease germs.

DISINFECTION.

Disinfection is based upon the fact that all these communicable diseases are caused by a micro-organism—specific in character, whose multiplication and vitality are dependent upon favoring conditions, that can be successfully combatted by agents denominated *disinfectants*. The terms "anti-

septics," "deodorants" and "disinfectants" are, by many, thought to express the same thing. They are widely different.

A deodorant has the power of removing offensive odors, but may have no disinfectant powers whatever, and *vice versa*, the disinfectant may have no deodorizing power. Therefore, the removal of an offensive odor by means of a deodorant does not remove the danger from disease germs already present.

An antiseptic is an agent which retards, prevents or arrests putrefaction, decay or fermentation. It may also arrest the development of the germs of disease, and may be used as a preventive of such diseases, but it does not destroy the life of disease germs, and hence cannot be relied upon when such germs are present.

A disinfectant or germicide is an agent which has the power of destroying germ life.

The following is a list of the most useful disinfectants:

I.—FIRE.

Complete destruction of every infected thing of little value.

II.—STEAM.

Under pressure, superheated, temperature 221° F. Exposure to this for ten minutes will destroy all germs. Ordinary steam at 212° F. will not penetrate sufficiently. Pressure is required to secure penetration. Every well regulated local health department should have ample facilities for the application of "steam" and "dry heat," where all infected articles suitable for such methods of infection that are too valuable to be destroyed should be officially disinfected. For this service a small fee might be charged.

III.—DRY HEAT.

Baking in an oven at temperature of 230° F. for two hours. Greater heat than this is liable to destroy the texture of most articles.

IV.—BOILING IN WATER.

Actively for half an hour. This will destroy all known germs of disease.

V.—FRESH CHLORIDE OF LIME.

Six ounces to one gallon of soft water. Specially useful for fæces, urine and sputa.

VI.—CORROSIVE SUBLIMATE.

(Bichloride of Mercury.) This is a powerful poison, and when the solution is made it should be colored by some aniline dye or permanganate of potash, so that it may not be mistaken for water. Always use wooden or crockery vessels for holding this solution.

VII.—CARBOLIC ACID.

Useful for most purposes.

VIII.—SULPHUR FUMES.

RULE 33. When a room and its contents are to be disinfected by sulphur fumigation, heavy woolen clothing, silk-, furs, stuffed bed covers, beds and other articles which cannot be treated with the solution, shall be so arranged in the room as to expose the greatest amount of surface, all pockets turned inside out, and after fumigation they should be hung in the open air, beaten and shaken. Pillows, beds, stuffed mattresses, upholstered furniture, etc., shall be cut open, the contents spread out, and thoroughly fumigated. Carpets shall be taken from the floor and so placed as to be thoroughly fumigated. It will add greatly to secure successful fumigation if the room be previously moistened by water spray or a dampened sponge.

RULE 34. If the disease was scarlet fever (scarlatina, scarlet rash) or smallpox, the paper on the walls or ceiling, if any there be, must be removed and completely burned. If the disease was diphtheria, typhoid fever or measles, the paper on the walls must be thoroughly dusted and brushed.

IX.—FORMALDEHYDE.

Clothing, bedding, or any infected article can be completely disinfected by immersing for two hours in a 2 per cent solution of formaldehyde. It is also useful for spraying walls, washing woodwork, furniture, etc.

This solution is made by taking one part by measure of the commercial formaldehyde solution and adding to it thirty parts of water.

GENERAL RULES.

The following rules for the use of disinfectants are recommended:

RULE 1. *Precautions to be taken when removing a patient suffering from a contagious disease.*—Remove all clothing, linen, coverings or other effects of the patient, and replace them by others which have not been used since the beginning of his illness or which have not remained in the room in which he has been isolated, unless, however, such clothing, linen, coverings or other effects, after having been used by the patient or having remained in his room, have been disinfected in the manner described in Rule 4. Provide the patient with rags for receiving his expectorations or evacuations during the transport, and burn these rags or disinfect them according to one of the three methods described in Rule 4.

RULE 2. *Disinfection of a house or apartment, and of the furniture and effects contained therein.*—First method: Formaldehyde vapor. Second method: Close all outlets of the premises to be disinfected, then fumigate with sulphuric acid by burning for at least six consecutive hours, four pounds

of sulphur for each 1,000 cubic feet of space. (a) Third method: Remove all the effects, furniture and articles contained in the premises in order to disinfect them in the manner described in Rule 4, then thoroughly wash the walls, ceilings and floors with a solution of bi-chloride of mercury; one drachm to a gallon of water.

RULE 3. *Disinfection of a vehicle or boat used in the removal of a patient or of the body of a patient who has died of a contagious disease.*—First method: Remove all cushions, curtains and other accessories, and disinfect them according to one of the methods described in Rule 4, then wash out the vehicle or boat with a solution of bi-chloride of mercury; two drachms to one gallon of water. Second method: Put the vehicle in a closed-in place and fumigate with formaldehyde or sulphur as described in Rule 2. Wrap the body in a well sewed sheet completely saturated with one of the following solutions: (1) Bi-chloride of mercury; two drachms to one gallon of water. (2) Carbolic acid; four ounces to one gallon of water. (3) Chloride of lime; six ounces to one gallon of water.

RULE 4. *Disinfection of everything taken out from the room where the contagious patient is isolated.*—Food: Burn the remains of the food which has been served to the patient, or sprinkle them with a solution of carbolic acid or bi-chloride of mercury, or sprinkle them with chloride of lime and bury them.

Vessels and utensils: Wash them in boiling water.

Clothing, sheets, napkins, coverings and other linen: (1) Burn them, if of little value; or, (2) Boil them in water for at least half an hour; or, (3) Steep them for four hours in a solution of one drachm of bi-chloride of mercury to one gallon of water; or, (4) Steep them for four hours in a solution of two ounces of carbolic acid to one gallon of water; or, (5) in a two per cent solution of formaldehyde for two hours.

Furniture, mattresses and articles which might be injured by the foregoing methods of disinfection; (1) Expose them for ten minutes to a current of steam in a suitable apparatus; or, (2) Expose them for two hours to dry heat at a temperature of 230° Fahrenheit; or, (3) If neither of the two preceding methods can be employed, put them in a well closed room and expose to the fumes of formaldehyde; or of sulphur as described in Rule 2 of General Rules.

(a) Many health boards have discarded the use of sulphur entirely as a disinfectant, because of the careless manner of its use.

To have a successful disinfection, every aperture, hole, joint, etc., must be impermeably closed, and the windows so arranged that they may be opened from the outside, either by a string or by some other contrivance, after disinfection is completed. It must be borne in mind that sulphurous acid gas (vapor of burning sulphur), when inhaled in large quantities, is destructive to life.

To insure the combustion of the sulphur, and as a precaution against fire, place the sulphur, either in powder or in small fragments, in an iron pan which should be placed upon a couple of bricks or stones in a tub partly filled with water. In order to insure the ignition of the sulphur, the surface should be well moistened with alcohol before applying the light. Several twisted slips of newspapers imbedded in the sulphur and projecting above the surface and ignited at their ends will answer the same purpose.

After the room has been subjected to these sulphur fumes twenty-four hours, throw open all doors and windows and air the house well, after which sponge all exposed surfaces with a solution of carbolic acid, two ounces in each gallon of water, and give a final scrubbing with soap and hot water.

Expectoration and evacuations: Collect them in vessels and mix with them one-half their quantity of one of the following disinfectants, to be left in contact with them for half an hour: (1) Bi-chloride of mercury, two drachms to one gallon of water. (2) Carbolie acid; four ounces to one gallon of water. (3) Powdered chloride of lime. (4) Chloride of lime; six ounces to one gallon of water. (5) Lime milk, prepared as follows: Sprinkle gradually lime of good quality with one-half its weight of water; dilute the powder so obtained with twice its volume of water. (a)

RULE 5. *Disinfection of persons and effects before leaving a house which has been quarantined.*—Wash, at least, the uncovered portions of the body, the hair and beard, with a solution of carbolie acid in the proportion of a tablespoonful to one gallon of water.

Completely change clothing, and put on other which has not remained in the infected house, or, if it has remained there, which has been disinfected in the manner described in Rule 4.

RULE 6. *Disinfection of the patient and his effects after his recovery.*—Wash the body with a solution of one tablespoonful of carbolie acid to one gallon of water.

Disinfect as described in Rule 4 all clothing and other articles used by him since a period of fifteen days before the beginning of his illness.

RULE 7. *Disinfection of a stable, enclosure, litters, excrements, blood and other contaminated liquids.*—Stable: First method: Close all outlets, then fumigate with formaldehyde; or sulphur as described in Rule 2.

Second method: Wash the walls, ceilings and floors with a solution of bi-chloride of mercury, two drachms to one gallon of water.

Third method: Whitewash with lime the walls, ceilings and floors.

Enclosure: Remove the dirt to a depth of three inches and bury it at least a foot deep.

Whitewash with lime the walls of the enclosure.

Litter, excrements, blood, and other liquids from the sick animal: Burn them, or bury them a foot deep, at least, after covering them with quick-lime.

RULE 8. *To disinfect a privy.*—Almost impossible to do it if full. Empty it.

1. Corrosive sublimate, two drachms to one gallon of water.
2. Carbolie acid, four ounces to one gallon of water.
3. Sulphate of copper (bluestone), four ounces to one gallon of water.
4. Chlorinated lime, one-half pound to one gallon of water.
5. Fresh slaked lime to cover the contents.
6. A 2 per cent solution of formaldehyde.

Whichever is used must be used in large quantities and added frequently.

In preparing any disinfectant solution, always use soft water, because the chemical constituents of hard water injure the solution. Always use a wooden or crockery vessel for any solution of corrosive sublimate.

RULE 9. *To disinfect rooms and their contents with formaldehyde gas.*

(a) Lime-milk keeps only for a few days, and only when the vessel containing it is kept carefully closed.

Formaldehyde gas is to be used in preference to any other gaseous disinfectant. In order to obtain desired results the following directions must be closely observed and practiced:

(1) All cracks or openings in the plaster or in the floor or about the door and windows should be calked tight with cotton or with strips of cloth.

(2) The linen, quilts, blankets, carpets, etc., should be stretched out on a line, in order to expose as much surface to the disinfectant as possible. They should not be thrown into a heap. Books should be suspended by their covers so that the pages are all open and freely exposed.

(3) The walls and floor of the room and the articles contained in it should be thoroughly sprayed with water. If masses of matter or sputum are dried down on the floor they should be soaked with water and loosened. No vessel of water should, however, be allowed to remain in the room.

(4) Eight ounces (240 C. C.) of the commercial 40 per cent formaldehyde solution for each 1,000 cubic feet of space, to be disinfected, should be used. This solution should be rapidly vaporized, or distilled into the room.

(5) The room thus treated should remain closed for ten hours.

(6) The apparatus used for carrying out these instructions must be approved by this Board, upon the recommendation of its bacteriologist.

(7) The so-called "disinfectant" lamps and other apparatus that use wood alcohol for generating formaldehyde are condemned as worthless, and their use cannot be considered as disinfectant.

RESTRICTION AND PREVENTION OF CONTAGIOUS DISEASES IN THE PUBLIC AND PRIVATE SCHOOLS—RULES AND REGULATIONS.

At a meeting of the Iowa State Board of Health, held March 24, 1898, the following rules, as revised by the Committee on Publication and Papers, were adopted for the restriction and prevention of contagious diseases in the public and private schools of this State, pursuant to authority vested by chapter 16, title 12 of the code, and the same are binding upon school boards, teachers, and all persons throughout the State.

By order of the Board,

J. F. KENNEDY,
Secretary.

J. I. GIBSON,
President.

RULES.

RULE 1. Every person entering any public or private school of Iowa must give satisfactory evidence of protection by vaccination.

RULE 2. The fact of vaccination and protection must be entered with each name on the school record, and on transfer and promotion lists.

Order of vaccination.—At a meeting of the State Board of Health, February 2, 1894, for the purpose of preserving and improving the public health, and of preventing the spread of the disease known as smallpox, the following rules and regulations were ordered:

First.—All persons in this State over the age of one year, who have not been vaccinated, or who in the opinion of the local board of health of the district or jurisdiction in which such persons reside or are found, do not furnish satisfactory evidence of protection from smallpox, are hereby ordered to be vaccinated.

Second.—Local boards of health and all officers who compose said boards, and all sheriffs, constables, city marshals, and police officers within their respective jurisdictions, are hereby directed to enforce the foregoing order as soon as practicable, and so far as said order shall apply to the pupils of any public or private school or to the teachers thereof. The officers of the school district in which such school is held shall also require its enforcement.

RULE 3. Persons affected with diphtheria (membranous croup), measles, mumps, rotheln, scarlet fever (scarlatina, scarlet rash), whooping cough, or smallpox, must be excluded from school until upon a certificate from the attending physician, showing complete recovery, thorough disinfection of his or her person and clothing, and the disinfection of the home, the mayor or township clerk, as the case may be, issues a written permit for their re-admission, after the quarantine rules of this Board have been first complied with. All other persons from families where such diseases exist shall also be excluded from the schools until they are furnished with a permit as above required.

RULE 4. Every school teacher who discovers among his or her pupils a case of these contagious diseases, must immediately report the fact to the mayor or township clerk, as the case may be; also, to the superintendent or principal of the school, and to the parents of the children, and must send the pupils thus afflicted to their homes at once. Teachers must not visit premises wherein are children sick with any contagious disease, and must carefully avoid exposure to such diseases.

RULE 5. If a person is ascertained to have attended school when affected with either of these contagious diseases, the local board of health shall immediately close the room wherein such person attended until it has been properly disinfected.

In case of an outbreak of smallpox in any community, or a threatened outbreak, every child attending the schools and every teacher must be examined relative to having been successfully vaccinated, and if they have not been vaccinated they must be excluded from the schools until so protected. This vaccination should include the community generally, as far as possible.

EARLY SYMPTOMS OF CONTAGIOUS DISEASE.

Smallpox.—This disease, though highly contagious, is comparatively rare, owing to the fact that vaccination is a safe preventive. Its early symptoms are so nearly similar to those of some other diseases that only an experienced physician can properly diagnose it. Vaccination and re-vaccination are better in this disease than rules for diagnosis or for restriction.

Scarlet fever.—This disease is also called *scarlatina* and *scarlet rash*, both of which names are misleading, inasmuch as they are often used to express some harmless form of eruption. They are both accommodating terms for and are identical with scarlet fever. The disease is often sudden in its

attack. There are nausea, vomiting; hot, dry skin; full, rapid pulse; high temperature, headache, flushed face; whitish coated tongue, with little red projections through the coating; very fine rash in the roof of the mouth, sore throat and pain in swallowing. Rash usually appears within the first twenty-four hours, first about the neck and face, and thence extends over the entire body. It is light red, uniformly smooth, and is followed by a white line, or mark, if the finger is passed over it. These symptoms may not all be present, nor in the order named. The *characteristic* symptoms are: Vomiting, high fever setting in early, sore throat, whitish furred tongue, and appearance of fine rash within twenty-four hours.

Measles—The onset of this disease is similar to what is commonly called "a cold in the head." Eyes watery and red, watery discharge from the nose, fever, hoarse, dry, husky and painful cough; and eruption in the roof of the mouth, with or without sore throat. The eruption does not appear before the second or third day—first in the forehead and face—is in patches and of a dull red color; and the skin has a roughened feel to the touch. The earliest initial symptoms are: *Watery eyes, sensitive to the light; discharge from the nostrils, sneezing; rough, dry cough, with pain under the breast bone; the late appearance of the eruption, its occurring in patches, with interspersed spaces of healthy skin, and the roughened feel and swollen appearance of the skin.*

Rotheln, or German measles.—This disease in its early symptoms occupies an intermediate place between scarlet fever and measles, without possessing the dangers of either. Hence it is better to mistake it for scarlet fever or measles and treat it as such than to mistake either measles or scarlet fever for rotheln and treat them as such. It is highly contagious, and children so affected must be sent home, and only allowed to re-enter the school on a certificate, as required in Rule 3. It should be treated by isolation and disinfection. The common symptoms are sore throat, watery eyes and nostrils, slight fever, an eruption appearing early on the neck and upper part of chest, rapidly spreading over the body and soon subsiding. There is very little constitutional disturbance. Its characteristic symptoms are: Moderate amount of fever, early appearance of a fine rash resembling the so-called "scarlet rash," with early disappearance of same, and more or less swelling of the glands of the neck.

Diphtheria.—This disease is especially characterized by precursory symptoms. There is more or less languor, impaired appetite, slight fever and restlessness for some days before the throat symptoms manifest themselves, and if diphtheria is prevalent in a community a child manifesting such symptoms should receive prompt attention and should excite serious apprehension. In addition to these premonitory symptoms, the pulse is rapid and rather feeble, the throat and soft palate are red and moderately swollen; there is pain on swallowing fluids rather more than solids; putrid breath and the appearance upon the tonsils of whitish or ash-colored spots, which rapidly coalesce and form a thick, leathery, ash-colored membrane.

If the air passages become involved there is a croupous cough and breathing. The characteristic symptoms of diphtheria are: Languor and debility; redness, soreness and swelling of the throat; fetid breath, ash-colored spots running together; rapid, feeble pulse, and croupous symptoms if there is extension of the membrane into the air passages.

Membranous croup so closely resembles diphtheria when the latter invades the air passages, that the Board has included it in the rules and regulations for the restriction and prevention of diphtheria.

Whooping cough.—Whooping cough is an infectious disease. A pupil affected with it must be excluded from the schools until entire recovery. There is no necessity for quarantining the adult members of the family, or premises, which should be placarded and the children excluded from the schools and from public gatherings.

Typhoid fever.—This disease closely resembles diphtheria in the initial symptoms. There is languor, a tired feeling lasting many days, headache, wakefulness, frequent diarrhoea, tongue red, especially at tip and edges, and tendency to bleeding at the nose, with fever, which gradually increases toward evening. There are no throat symptoms.

Typhoid fever is deemed to be the result of a special contagium present in the excreta of typhoid fever patients. The disease germ is multiplied after being thrown from the bowels, and finds its way into the intestinal track through water or food. The patient should be isolated from the well, and all discharges be thoroughly disinfected and buried. The premises need not be quarantined.

Upon the outbreak of diphtheria or typhoid fever, the teacher, especially in country districts where the local board of health is too often ignorant or neglectful of their duty, should suggest, and so far as possible, insist upon a careful inquiry into the source and healthfulness of the water supply. In nearly all such cases the drinking water is found contaminated, and its early discovery may prevent many other cases occurring.

Isolation.—Isolation means the complete exclusion of all other persons from the sick except the nurse and attending physician; that the nurse shall be restrained from going to and from the premises, or mingling with the family; that all well persons shall be prevented from contact with bedding, clothing, food or other articles that have been used on or about the sick. Where from necessity the parents or family are nurses, the isolation and quarantine apply to them.

LOCAL BOARDS OF HEALTH.

REGULATIONS.

Organization.—The mayor and council of a city or incorporated town, and the trustees of a township are the local board of health. The clerk of a city, recorder of a town, or the clerk of a township is the clerk of the local board.

It is only necessary for the board to elect a president, or chairman from its members, and a health officer, to complete the organization of the board.

Meetings.—Local boards must meet on the first Monday in April and October, and at such other times as may be necessary for the protection of the public health. Notice to all members must be given of all emergent meetings. The board cannot delegate any person or committee to do any act required to be done by the board.

Meetings of the board must be separate and distinct from meetings as trustees. When in session as trustees, they must adjourn and reconvene as a local board. This, for the reason that the local board is created, and derives its powers, under a different statute than that of trustees. They cannot act as a local board when sitting as trustees. It is important that these distinctions be understood and fully observed, as frequently large expenses are incurred by local boards, and the Supreme Court says such boards must act in the manner prescribed by statute.

The same rule applies to local boards of cities and towns.

All proceedings of a local board shall be kept in a separate record, and shall embrace every action of the board.

Compensation.—The statute creating local boards makes no provision for the compensation of such boards, but it is provided in the code that township trustees shall receive “for each day’s services of eight hours necessarily engaged in official business, to be paid out of the county treasury, two dollars each.” When engaged in the duties of a local board, the trustees are engaged in official duties imposed by the statute. The same rule applies to the clerk.

The statute provides that the local board shall fix the compensation of all persons employed by them in the execution of the health laws, of their own regulations, and regulations of State Board. The presumption of law is that these expenses are to be paid in the same manner as other expenses of the township. Whoever is employed, the employment must be by the local board, not by any member of the board, nor by a committee of the board.*

Expenses.—The statute, section 2571, says all expenses incurred in the enforcement of the health law “shall be paid by the town, city or township; in either case all claims to be presented and audited as other demands. In the case of townships, the trustees shall certify the amount required to pay such expenses to the board of supervisors of the county; and it shall advance same, and at the time it levies the general taxes, shall levy on the property of such township a sufficient tax to reimburse the county, which, when collected, shall be paid to and belong to the county.”

Regulations.—Local boards must adopt such regulations as are necessary for the protection of their jurisdiction, regarding nuisances, sources of filth, and causes of sickness, etc.; and also enforce regulations made by the State Board of Health.

Regulations when adopted must be put on record and public notice given by publication or posting. The State Board has prepared regulations suitable for posting in townships, which will be sent to local boards upon a request for Form 28B.

It is not sufficient for a local board by resolution to merely adopt regulations of the State Board. The specific regulations must be named, a copy thereof marked for identification, and filed in the clerk’s office, and the facts put on record.

To render one liable for violation of an order of a board of health there must be legal evidence that the order was made by the board. The mere service of notice is no evidence of the action of the board. There must be

*The board of supervisors does not have the right to regulate the fees and charges of persons employed by the local boards of health.—*Tweedy v. Fremont County*, 68 N. W., 981.

record evidence of the action of the board regarding the subject matter, as the removal of a nuisance, or the incurring of expenses.

It is the duty of local boards as public officers, to provide all possible protection to the lives and health of the people of their jurisdiction. The statute says they shall do this. For neglect of official duty they are liable to heavy penalty. Not only this, the courts have established the rule that the corporation of which they are such officers is liable to damages for injuries sustained by reason of neglect of official duty of such officers. Every stagnant body of water, with green slime throwing off noxious vapors and disease; every filthy, stinking alley with accumulated garbage and rotting manure; filthy stock yards; noxious waste from creameries; every cesspool and privy exhaling disease, every knacker plant, or every slaughter house, comes within the purview of the duties of a local board. A city or town may enforce regulations made by the local board of health by the enactment of an ordinance providing a penalty for any violation of such regulations. Copies of such ordinance may be procured upon application to the Secretary for Form 115B.

Jurisdiction.—Local boards have no jurisdiction beyond the limits of the territory of which they are the board. Where a town is within a township, the township board has no jurisdiction within the town, except in a case when the town aforesaid owns and operates a cemetery within the township aforesaid, in which case the town has jurisdiction over said cemetery. It may quarantine against the town whenever deemed necessary. When a city or town includes an entire township, the local board of the city or town has superior jurisdiction.

While certain duties are devolved upon the mayor and clerk, under the law, these officers are subject to the general powers of the local board.

Quarantine.—Quarantine applies to all institutions, public or private, city, county or state.

All expenses incurred by reason of quarantine must be by direct order of the local board, when in session, or by some regulation of the board duly made and recorded.

Health officer.—The statute requires every local board of health to appoint a "competent physician" as health officer. The provision is mandatory, not directory. The local board has no discretion in the matter; the statute says they *shall* appoint. The presumption of law is that he is to be the sanitary adviser and counsel of the board.

He should be competent to diagnose correctly all contagious and infectious diseases. He should be a person of practical, professional experience, and of good judgment and discretion. He should be the most "competent physician" obtainable, as the statute makes competency the required qualification. It makes no difference to what school of medicine he belongs.

A physician who is a member of a local board may be also the health officer of the board, but he must be elected to the office.

The powers and duties of a health officer must be previously given by a local board when in session, and must be of record. He has power to do whatever is directed by the local board, not in contravention of the statute, the rules and regulations of the State Board, or the lawful powers of the local board.

He is in advisory counsel of a local board in sanitary matters, and not an executive officer, except when made such by formal action of the local board.

It is not his duty to attend persons quarantined for contagious diseases. The sick, when quarantined, may employ whom they please to attend them during sickness, except in the case of paupers, as provided in the code, and neither the health officer nor the local board can interfere. It is not his duty to assist an undertaker in preparing for burial the body of a person dead from contagious disease, unless so specially directed by the local board as a protective measure.

It is not his duty to verify the statement of an attending physician as to suspected cases of contagious disease. Whenever well authenticated symptoms lead to a certainty that the attending physician is in error in diagnosis, it is the duty of the board to direct the health officer, or other person, to visit the case, but such visit should not be made except after notice to the attending physician, and a courteous recognition of his professional rights.

It is not his duty to put up danger signals. That should be done by some police officer, constable or specially delegated officer.

It is not his duty to disinfect quarantined premises. That should be done under the supervision of the attending physician, or some member of the board, acting by advice of the health officer. Upon the occurrence of smallpox within his jurisdiction he must report the same by telegraph—if there be no telegraph, by mail—to the State Board, and this whether the case be mild or severe, or modified by vaccination.

It is his duty to study the cause, rise, progress and decline of any epidemic disease in his jurisdiction, and report the same to the State Board on subsidence of the disease.

It is his duty, by statute, to make a report to the State Board on blank forms furnished by the State Board, of statistics concerning the jurisdiction of which he is the health officer. If he is the health officer for a township and a city or town within a township, or more than one township, he must make a separate report for each board, just as distinct and separate as though made by different persons.

He must be a lawful physician—holding a certificate of authority to practice medicine, from the State Board of Medical Examiners. The State Board of Health will not recognize any but lawful physicians as health officers of local boards. It is doubtful if a local board can appropriate public money to pay for the services of a person not lawfully qualified to perform the service.

He is a public officer and must take the oath required of every civil officer before entering upon the duties of his office. He must be a citizen of the State, but not necessarily an elector or voter of the place where he is elected, hence he may be the health officer of more than one local board.

No compensation is fixed by statute. That must be done by the local board. If given an annual salary such salary will be deemed by law in full compensation for all services rendered in connection with the duties of his office, unless the board otherwise provide. The presumption of law is that his compensation will be paid in the same manner as other expenses of the city or township, except in cases of quarantine of contagious diseases, the

expenses of which are to be paid by the county if the persons quarantined are unable to pay.

Nuisances.—Local boards must make such regulations respecting nuisances, sources of filth, and causes of sickness as are necessary for the protection of the public health.

While the statute gives the board the discretionary exercise of judgment as to what they may deem necessary for the public health, the intent and purpose of the whole statute is the protection of the public health, and it is mandatory. The statutes have defined clearly what are nuisances. (1)

(1.) Code, Section 5078: "The erecting, continuing or using any building or other place for the exercise of any trade, employment or manufacture, which, by occasioning noxious exhalations, offensive smells or other annoyances, becomes injurious and dangerous to the health, comfort or property of individuals or the public; the causing or suffering any offal, filth or noisome substance to be collected or to remain in any place to the prejudice of others; the obstructing or impeding without legal authority the passage of any navigable river, harbor or collection of water; or the corrupting or rendering unwholesome or impure the water of any river, stream or pond, * * * are nuisances."

"Where an indictment charged that the defendant 'unlawfully and injuriously did erect, continue and use a certain inclosure, or pen, in which cattle and hogs were confined, fed and watered, and the excrement, decayed food, slops and other filth were retained,' whereby were occasioned 'noxious exhalations and offensive smells, greatly corrupting and infesting the air, and other annoyances dangerous to the public health, comfort and property of the good people residing in that immediate neighborhood,' it was held that the acts charged constituted a public, indictable nuisance, both under this section (4089) of the statute, and at the common law." *The State v. Kaster*, 35 Iowa Supreme Court Reports, 231.

Any use of property, or any trade, that corrupts the atmosphere with smoke, noxious vapors, noisome smells, dust or other substances or gases producing injury to property or to health, or impairing the comfortable enjoyment of property, is a nuisance. Wood on Nuisances, p. 574, Sec. 531.

Where defendant erected stockyards so near plaintiff's dwelling, and so kept them that the odors therefrom were not only an annoyance but were unwholesome, threatening the health of plaintiff and his family, held that the defendant could not escape liability on the ground that the yards were necessary to the operations of the road, and that the odors could not be avoided. *Shively v. Cedar Rapids, I. F. & N. W. R. R. Co.*, 74 Iowa, 170.

Meeker v. Rensselaer, 14 Wend., 397.

In the case of *City of Salem v. Eastern Railroad Company*, the Supreme Court of Massachusetts (98, p. 443) under a statute which is a verbatim copy of the Iowa statute, held that the adjudication of the board that a nuisance exists is conclusive, and no appeal lies therefrom. The board should keep an accurate record of their proceedings and all adjudications should appear therein in clear and distinct language. It is not the purpose of the order to direct in what mode the person should proceed to remove the nuisance. It should direct the end to be accomplished, leaving the party to adopt any effectual mode he may choose. If the owner or occupant neglects to remove the nuisance the board are at liberty to enter upon private property, where it exists, and take such measures as they may see fit for its removal.

The court further says, in relation to boards of health: "Their action is intended to be prompt and summary. They are clothed with extraordinary powers for the protection of the community from noxious influences affecting life and health, and it is important that their proceedings should be embarrassed and delayed as little as possible by the necessary observance of formalities. Although notice and opportunity to be heard upon matters affecting private interests ought always to be given when practicable, yet the nature and object of those proceedings are such that it is deemed to be most for the general good that notice should not be essential to the right of the board to act for the public safety. Delay for the purpose of giving notice, involving either of public notice or of inquiry to ascertain who are the parties whose interests will be affected, and further delay for such hearings as the parties may think necessary for the protection of their interests, might defeat all beneficial results from an attempt to

exercise the powers conferred upon boards of health. The necessity of the case, and the importance of the public interests at stake, justify the omission of notice to the individual.

"Notice must be given of general regulations prescribed by the board before parties can be held in default for a disregard of their requirements. No previous notice to parties so to be affected by them is necessary. They belong to that class of police regulations to which all individual rights of property are held subject, whether established directly by enactments of the legislature, or by its authority through boards of local administration."

Shuster v. Met. Board of Health, 49 Barb. (N. Y. S. C.), 450; Wood on Nuisances, Secs. 494, 504, 535.

A slaughter house in a city or public place, or near a highway, or where numerous persons reside, is *prima facie* a nuisance. *Bushnell v. Robeson & Co.*, 62 Iowa, 540.

Wood on Nuisances, Sec. 887.

A nuisance is anything done or permitted which injures or annoys another in the enjoyment of his legal rights. Every person has the legal right to the fullest enjoyment of his life and health. Therefore, anything which injures or annoys the public in the enjoyment of life or health is a nuisance, which it is the duty of a local board to abate. With nuisances affecting only private interests, local boards have nothing to do, as where A complains that a schoolhouse privy situated just across the street from his residence is unsightly. The order of the local board for its removal must be upon the ground that it is dangerous to the public health.

If a local board of health finds any decomposing or offensive matter upon private property, which, in their opinion, is injurious to the public health; or if a local board of health at one of its meetings should, upon investigation, find and determine that the emptying of refuse matter into a river, or into any passage way which conducted it into the river, was causing a nuisance dangerous to health and life, or that such refuse matter was being disposed of in any other such way as to cause a nuisance, the board must make a record of that fact and order the owner of the property, place or building to remove the nuisance or cause of sickness within twenty-four hours, or such other time as is deemed reasonable. After notice is served in accordance with the statute, if the owner or occupant fails to comply with such order, then the board can lawfully make another order directing the removal of the nuisance or cause of sickness, and provide that the expense thereof shall be paid by the owner, occupant, or other person who caused or permitted the objectionable conditions. The local board can then take such reasonable steps as is deemed proper to summarily and promptly execute this order, and the expense of the same can afterward be recovered against the party whose duty it was in the first instance to remove the nuisance or cause of sickness.

This work of removal or prevention must be executed with as little danger as possible to the owner of the property or others, consistent with the imperative demand of safety to the lives and health of the inhabitants. But the controlling motive must be this safety, and to the extent that the objectionable conditions threaten it. To that extent they must be removed or prevented, whatever the consequence to the individual may be.

The board of health should be careful to keep a full and accurate record of its proceedings. All jurisdictional requirements should be stated in the record, and the finding of facts should be clearly stated therein. The adjudications of the board should be stated in unmistakable language.

The power of the board of health is extraordinary, and its exercise may result disastrously to individual interest; but the emergencies that confront the board are very great, involving the destruction of health and life. In this conflict individual interest must yield, and the public welfare have sway.

It is undoubtedly the intention of the code contained in section 2573, to leave it to the owner or occupant to cause this removal or prevention with as little injury to himself as possible, and to leave it to him to determine what method he will adopt, requiring only that this method shall be effectual. If he fails to act within the time designated, then the board must act.

A local board has no authority to order a business closed, or stopped. That power is vested in the courts, but has power to require that it shall be conducted in a clean and wholesome manner, and not offensive to the public.

Schools.—When a contagious disease appears in a community, the schools should not be closed unless the sick outnumber the well, and the school becomes decimated. By closing the schools the children are thrown together by intervisiting and play, and the risk of exposure thereby is greatly increased. By continuing the school, and isolating the sick, the danger of exposure is greatly decreased.

If a pupil is affected, the teacher must immediately remove such pupil from the school, and unless the other children in the family go from home to live, they also, must be excluded from the school. The exclusion of pupils is a part of the quarantine regulations, with which neither the attending physician, school directors, nor even health officers can interfere.

Should any pupil be attacked with any infectious disease in any school-room all the pupils in such room shall at once be dismissed and the school-room remain closed until thoroughly disinfected.

If a teacher is boarding in a family wherein is a contagious disease he must immediately change his boarding place.

While schoolhouses are by law in the control of school directors, it is within the power of a local board of health to prohibit their use whenever it is deemed necessary for the protection of the public health, and it is their duty to prohibit their use.

Quarantine expenses.—Local boards must provide by regulations for furnishing supplies, nurses, medical attendants, etc., where quarantine is established, otherwise they will fail to receive the expense thereof from the county. The mayor, clerk, or health officer has no authority to incur such expense.

If a local board has neglected to make such provision and a contagious disease appears in their jurisdiction, the board must convene immediately and make the necessary provision for the care of the sick, nurses, etc., and make such orders as are necessary for the suppression of the disease. This cannot be done by any member of the board nor by a committee of the board, except upon direct order of the board. The supreme court has so decided.

Penalty.—The code, section 2573, makes the following provision for violation of regulations of the State Board and of local boards:

"Any person being notified to remove any nuisance, source of filth or cause of sickness, as in this chapter provided, who fails, neglects or refuses to do so after the time fixed in such notice, or knowingly fails, neglects or refuses to comply with and obey any order, rule or regulation of the state or local board of health, or any provision of this chapter, after notice thereof has been given as herein provided, shall forfeit and pay the sum of twenty dollars for each day he refuses obedience, or for each day he knowingly fails, neglects or refuses to obey such regulations, or knowingly violates any provision of this chapter, to be recovered in an action in the name of the clerk of the board, and, when collected, to be paid to the clerk of the town, city or township, as the case may be, and for its benefit; and, in addition thereto, anyone so offending, or knowingly exposing another to infection from any contagious disease, or knowingly subjecting another to the danger of contracting such disease from a child or other irresponsible person, shall be liable for all damages resulting therefrom, and guilty of a misdemeanor."

Prosecutions.—The Attorney-General gives it as his opinion that under the statute it is a criminal offense for any person to violate regulations and rules made by a local board. This includes disobedience to quarantine lawfully established. It is also the duty of the county attorney to give advice and counsel to the local boards of health, and to prosecute persons who violate the rules of the board of health and refuse to obey the order of quarantine. The proceedings to impose a fine should be brought by information in the name of the State, it being a criminal action.

When information is filed, notice must be given the county attorney of the time and place of hearing.

AN ORDINANCE RECOMMENDED FOR ADOPTION BY CITIES AND TOWNS.

For the Protection of the Public Health and for the Restriction and Prevention of Contagious Diseases.

SECTION 1. Be it ordained by the Common Council of the..... of.....that it shall be the duty of every physician residing, or practicing, within the limits of this.....to give written notice to the mayor immediately, of any case of Asiatic cholera, smallpox, diphtheria, (membranous croup), scarlet fever (scarlet rash, scarlatina), typhoid fever, measles or whooping cough that he may be called to attend professionally, and any physician who shall neglect, or refuse, to give such notice as herein required, within twenty-four hours after he shall first visit and ascertain the character of any such disease herein named, shall be fined not less than ten dollars nor more than twenty-five dollars for each and every day he so neglects to give such notice. In all cases where no physician is in attendance, it shall be the duty of any person having charge of, or being at the head of a family, or having the care or custody of any lodging rooms, to give notice in like manner as required herein of physicians, and with like penalty for neglect or refusal.

SEC. 2. It shall be the duty of the mayor upon receiving written notice of the existence of a case of Asiatic cholera, smallpox, diphtheria (membranous) croup, scarlet fever, scarlet rash, or scarlatina, to forthwith quarantine the premises, by serving written notice to the occupants thereof, and placing a danger card thereon; and take such measures as may be necessary and proper for the restriction and suppression of such disease; and to investigate all the circumstances attendant upon the occurrence of the same. He shall also make proper provision for care of the sick. Where the disease is measles or whooping cough, the premises shall not be quarantined, but they shall be placarded with the danger card.

And it shall be the further duty of the mayor to disinfect, or cause to be disinfected, the premises whereon such quarantined diseases have occurred, together with all infected furniture, bedding, clothing and other articles, as provided by regulations of the State Board of Health.

SEC. 3. For the purpose of this ordinance quarantine shall be deemed to be:

(1.) The placing upon such conspicuous place on each building, hall, lodging room, or place wherein exists a contagious disease, as will best protect the public health, of a cloth or card not less than eighteen inches square, having imprinted thereon in large letters the word "Quarantine," the name of the disease, and the words: "No person shall be permitted to enter or leave these premises except as provided by law, while it is quarantined, under the penalty provided by law."

(2.) The separation of the sick from all other persons, if possible, and from all persons except those in actual attendance;

(3.) The complete exclusion of all persons from the premises;

(4.) That no person shall leave said premises except the attending physician without a permit therefor signed by the mayor;

(5.) That no article that has been used on or about a person sick with a contagious or infectious disease shall be removed from the sick room, nor from the premises, until the same has been properly disinfected.

SEC. 4. Nurses who have been employed to care for persons sick with contagious disease may be released from quarantine when their services are no longer required, upon the order of the mayor. Before leaving the premises there must be thorough disinfection of their person and clothing.

SEC. 5. Isolation means the complete exclusion of all other persons from the sick except the nurse and attending physician; that the nurse shall be restrained from going to and from the premises, or mingling with the family; that all well persons shall be prevented from contact with bedding, clothing, food or other articles that have been used on or about the sick. Where from necessity the parents or family are nurses, the isolation and quarantine apply to them.

SEC. 6. Quarantine shall be established and maintained in each and every case for the period named herein, to wit:

Scarlet fever.—(Scarlatina, scarlet rash), thirty-five days.

Diphtheria.—(Membranous croup) thirty-five days.

Smallpox.—Forty days.

Asiatic cholera.—Twenty-one days.

SEC. 7. When a family is quarantined for diphtheria, the head of the family, or bread-winner, may, at the discretion of the local board, have the privilege of attending to his regular business, and of going to and from his house only when complying with the following conditions, and the mayor shall issue a permit therefor:

First.—He shall change his clothing before going to and leaving his home to go to his place of business.

Second.—He shall wash his hands, face, head and beard with a 2 per cent solution of carbolic acid, each time before leaving his home to go to his place of business

Third.—While in the house he shall not act as nurse or live in the same room with the sick person.

Fourth.—He shall not attend any public meeting, or attend any place where persons are congregated.

Fifth.—This privilege shall not be granted to school teachers, nor to any person whose business brings him in intimate contact with children.

SEC. 8. Whenever there is complete recovery or death of persons who have been sick with a contagious disease, and there are no further exposures thereto, the quarantine may be released, although the period prescribed herein has not elapsed. *Provided*, that no release of quarantine shall be permitted until at least seventeen days after the recovery of the last case, and proper disinfection of person and premises is made as hereinafter provided.

SEC. 9. After death or recovery of persons sick from contagious or infectious disease, the room, furniture, and other contents not to be destroyed, shall be thoroughly disinfected in accordance with regulations made by the State Board of Health.

If the disease was scarlet fever (scarlatina, scarlet rash) or smallpox the paper on the walls and ceiling, if any there be, shall be removed and completely burned. If the disease was diphtheria, typhoid fever or measles the paper on the wall should be thoroughly dusted and brushed.

SEC. 10. No order for the release of quarantine shall be made by the mayor, except upon a report from the attending physician stating the number of persons on the quarantined premises sick with the infectious disease in question, their name, age and when the disease first appeared in each case, when recovered, and the means, if any, used for disinfection. If the mayor shall find that the regulations of the State Board of Health respecting quarantine and disinfection have been complied with the quarantine shall be forthwith released. If quarantine regulations have been complied with, and proper disinfection has not been done the mayor shall order it done under the supervision of the health officer or some other competent person and the quarantine shall be continued until it is done.

SEC. 11. No person shall give, lend or sell, or offer for sale any clothing or other articles liable to convey infection of any contagious disease unless the same have been disinfected and such disinfection approved by the mayor.

SEC. 12. If any person shall wilfully or maliciously remove or deface, or cause to be removed or defaced, any signal of danger, or cloth or card placed upon any quarantined premises, without proper authority as provided herein, he shall be fined not less than twenty-five dollars, or impris-

oned not less than five days, or be both fined and imprisoned at the discretion of the court.

SEC. 13. If any person has attended school when affected with diphtheria (membranous croup), scarlet fever (scarlatina, scarlet rash), smallpox or measles, the room in which such person attended shall be immediately closed, until properly disinfected.

SEC. 14. It is the duty of every school teacher and school officer who discovers, or who has knowledge of a case of these contagious diseases, to cause the fact to be immediately reported to the mayor.

SEC. 15. During the existence of any contagious or infectious disease in any family or household, or place, in this.....and until after the recovery of the sick and the disinfection of the premises where such disease shall have existed, no person residing in such household, family or place, shall be permitted to attend any public meeting without written permission from the mayor, and no superintendent, teacher or officer of any school shall permit any child or person from any such family, household or place, to attend any school without a permit from the mayor, upon the recommendation of the attending physician showing thorough disinfection of the person, clothing and premises. And any person who shall knowingly violate any of the provisions of this section shall be fined not less than twenty-five dollars, or be imprisoned not less than five days.

SEC. 16. When Asiatic cholera, smallpox, diphtheria, (membranous croup), scarlet fever, (scarlatina, scarlet rash), typhoid fever, leprosy, measles, or any other contagious disease exists in any house or dwelling place of a dealer in, or seller of milk, he shall discontinue, and cease to give, or sell, or distribute milk to any person, or to creameries or butter factories, or in anywise handle such milk, until a permit is granted therefor by the mayor. And no person who attends cows, and does the milking, or who has care of milk vessels, or the sale or distribution of milk, shall be permitted to enter any premises or place wherein exists any of the diseases named herein, nor have any communication, direct or indirect, with any person who resides in, or is an occupant of such infected place; nor shall any milk or butter be given away, sold or distributed from such infected place. And any person, either as principal, agent, or employe, who shall violate any of the provisions of this section, shall be fined not less than twenty-five dollars, nor more than fifty dollars, or be imprisoned not less than five days, nor more than ten days, or both fined and imprisoned at the discretion of the court.

SEC. 17. Every person, firm, or corporation, or agent, or employe thereof, who shall sell milk or cream from a wagon, depot or store; or sell or deliver milk or cream to a hotel, restaurant, boarding house, public place, or private residence in this.....shall furnish satisfactory evidence that said milk or cream is taken from cows that are free from tuberculosis.

SEC. 18. No person, company, corporation or association having charge of, or control of, any schoolhouse or church, or of any building, room or place used for school or church purposes, or for any public assembly in this.....shall permit the body of any person dead from any of the contagious or infectious diseases named in this ordinance, or any other dangerous contagious disease, to be taken into such schoolhouse, church,

building, room or place, for the purpose of holding funeral service over such body; and no sexton, undertaker or other person having charge of, or direction of, the burial of any body dead from any of the said diseases, shall permit the coffin or casket containing such body to be opened in the presence of any child, nor shall any child be permitted to act as pallbearer or carrier at any such funeral. Any person who shall violate, or cause to be violated, any of the provisions of this section shall be liable to a fine of not less than twenty-five dollars, or to imprisonment not less than five days, or to both fine and imprisonment at the discretion of the court.

SEC. 19. If any person, whether as owner, occupant, lessee or agent, shall rent or lease, or permit the occupation by any person of any house, room or place in which there have been any of the contagious diseases named in this ordinance, unless the same has been previously thoroughly disinfected, and such disinfection approved by the mayor, he shall be fined not less than one hundred dollars, or be imprisoned not less than thirty days, or be both fined and imprisoned at the discretion of the court, and it shall be the duty of the mayor and sanitary police to maintain a danger signal upon any such premises, as provided in section three of this ordinance, until such disinfection be made.

SEC. 20. A body dead from smallpox must be immediately wrapped in a cloth saturated with the strongest disinfectant solution, without previous washing, and buried deep, and nobody dead from this disease shall under any circumstances, or any lapse of time, be disinterred.

SEC. 21. The body of a person who has died from Asiatic cholera, yellow fever, leprosy, diphtheria (membranous croup), scarlet fever (scarlatina or scarlet rash), must not be removed from the sick room until it has been wrapped in a cloth saturated with a solution of corrosive sublimate (one ounce to six gallons of water), and then tightly enclosed in a coffin. The body shall then be buried immediately without the attendance of any person other than is necessary for the interment thereof.

SEC. 22. No public funeral shall be held of any person who has died from either of said diseases named in sections 20 and 21, and no public funeral shall be held in a house, nor on any premises where there is a case of, nor where a death has recently occurred from, either of said diseases.

SEC. 23. Any railroad car, street car, omnibus, cab, hack, or other vehicle, in which a person has been carried affected with any of the diseases named herein, shall be forthwith removed from service and be disinfected before being used again. And any person, either as owner, lessee, agent, or employe, who shall violate the provisions of this section in the use of such vehicle, shall be fined not less than \$50, nor more than \$100, or be imprisoned not less than ten days, nor more than thirty days, or be both fined and imprisoned at the discretion of the court.

SEC. 24. Rules and regulations made by the State Board of Health and by the local board of health of this.....concerning Asiatic cholera, smallpox, diphtheria, (membranous croup), typhoid fever, scarlet fever, or other contagious or infectious diseases, shall be enforced by the mayor under the supervision of the health officer; and all police, and other public officers of the city, in their proper capacity, are now hereby commanded and enjoined to aid and assist the board of health, the mayor, and health officer in the enforcement of said rules and regulations.

SEC. 25. It shall be the duty of all police officers to observe the sanitary condition of their districts, and to report through their chief to the health officer promptly, any nuisance or accumulated filth found in any portion of the corporation.

SEC 26. The mayor shall have authority to appoint sanitary police whose duty it shall be to aid in the establishment and enforcement of quarantine regulations, and such other sanitary regulations as may be provided by the local board and the State Board of Health, and at such time, and in such manner as the mayor or the health officer may direct. Said sanitary police shall visit each quarantined premises at least once each forty-eight hours, and at such other times as the mayor or health officer may direct. He shall see that strict quarantine is maintained, and the premises properly placarded. *Provided*, he shall not enter any dwelling or place unless so requested by the occupants thereof, nor shall he disturb the inmates or the sick unless he has good and sufficient reason to believe there is wilful violation of the quarantine regulations therein. He shall have full powers of a police officer to make arrests for violations of quarantine or health regulations, and shall file information against such offenders before the police court. He shall appear for duty at the office of the mayor on or before 10 o'clock A. M. each day. His compensation shall be the same as that allowed other police officers.

BURIALS.

SEC. 27. Upon the death of any person within the limits of this..... it shall be the duty of the physician who was attending at the time of death, or of the coroner, when the case comes under his official jurisdiction, to furnish within twenty-four hours after such death, to the undertaker, or other person superintending the burial of said decedent, a certificate setting forth the full name, age, sex, color, place of death, date and cause of death, and such other facts as may be required by regulations of the State Board of Health and the statutes of the state of Iowa. If any person shall die without the attendance of a physician, or if the physician who did attend the decedent at the time of death shall neglect or refuse to give such certificate as aforesaid, it shall be the duty of the undertaker, or of any person acquainted with the facts, to report the same to the health officer of the local board of health, who is hereby authorized to give a certificate of death as aforesaid, *provided*, it be not a case requiring the attendance of a coroner.

SEC. 28. No sexton, or other person or persons, having charge or control of any cemetery, burying place, or tomb, or vault within the limits of this..... or under the control of this.....; and no undertaker, or other person or persons, shall inter, entomb, or place in any vault within the limits of this..... the dead body of any person, or remove such body from or out of the without having procured a certificate of death as herein provided; and it shall be the duty of any undertaker, or other person or persons having charge of the burial or removal of the dead body of any person to deliver said certificate of death forthwith to the clerk of the local board of health.

SEC. 29. It shall be the duty of the clerk of the local board of health upon the presentation of a certificate of death in accordance with the provisions of this ordinance, and not otherwise, to issue a permit to inter,

entomb, or place in a vault the body of the deceased person named in such certificate, and said clerk shall be entitled to charge and receive for issuing such permit a fee of.....cents. *Provided*, a body dead from diphtheria (membranous croup), scarlet fever (scarlatina, scarlet rash), smallpox, Asiatic cholera, leprosy or typhus fever shall not be deposited in a receiving vault.

SEC. 30. Upon the presentation of the proper application in accordance with the regulations made by the State Board of Health for the removal of the dead body of a human being out of the limits of this....., it shall be the duty of the clerk of the local board of health to issue a permit countersigned by the mayor for such removal. *Provided*, that where said body is to be disinterred such application must be accompanied with a disinterment permit from the State Board of Health, but no permit for such removal shall be granted in any case of a body dead from Asiatic cholera, smallpox, diphtheria (membraneous croup), scarlet fever (scarlatina, scarlet rash), leprosy, typhus fever or yellow fever, or from any sequela or complications of said diseases; nor shall any permit for such removal be granted in any case whatsoever where the cause of death was a contagious or infectious disease, or any sequela of such disease, unless the permit be approved and signed by the health officer of the local board of health; nor shall a permit be granted except upon the presentation of the proper certificate of the cause of death.

SEC. 31. The clerk of the local board of health shall enter in a suitable book to be kept for that purpose, a record of all burial permits issued, specifying the date of issue, to whom issued, together with all the items of information contained in the certificate upon which the permit was issued. And on or before the tenth day of each month he shall report to the State Board of Health the deaths and causes thereof for the preceding calendar month.

SEC. 32. No hack, omnibus, street car, or other closed vehicle used for the conveyance of the living, shall be permitted to carry the body of any person dead from an infectious or contagious disease; nor with the knowledge of the owner, driver or person in charge thereof, to carry any person or article liable to communicate the infection or contagion of such disease.

SEC. 33. Each undertaker or sexton, and every person engaged or concerned in the burial of the body of a human being in violation of the provisions of sections twenty-seven, twenty-eight, and thirty-two of this ordinance, and the owners, officers and employees of any transportation company, or any other person, engaged or concerned in the removal of such dead body from the limits of this.....in violation of any of the provisions of this ordinance, shall be fined not less than fifty dollars, nor more than one hundred dollars, or be imprisoned not less than ten days, nor more than thirty days, in the discretion of the court, for each offense.

SEC. 34. If any person shall neglect or refuse to furnish the certificate of death as required by section twenty-seven of this ordinance, he shall be fined not less than five dollars for each offense. *Provided*, that this section shall not apply to coroners engaged in official investigation of a cause of death.

SEC. 35. If any physician, or any other person within the limits of this....., shall knowingly attempt to secrete, or withhold the

true character of any of the contagious or infectious diseases specified in this ordinance, or shall in any manner whatsoever attempt to deceive or defraud, or who shall make any false statement in making a certificate of cause of death as required by this ordinance, by giving any other than the true cause of such death; or if the decedent was affected with any of such contagious or infectious diseases during his last sickness, he shall neglect or refuse to state such fact in such certificate, he shall be fined not less than twenty-five dollars, nor more than one hundred dollars, or be imprisoned not less than five days, nor more than thirty days, or be both fined and imprisoned at the discretion of the court.

SLAUGHTER HOUSES.

SEC. 36. No slaughter house shall be erected nor used within the limits of this.....unless a permit from the mayor has been first obtained, with the advice and assent of the health officer, and no slaughter house shall be erected, nor used, within 320 feet of any public highway, nor within 600 feet of any dwelling house, schoolhouse or church, or any building used for church purposes. It shall be erected on dry, hard land, that can be well drained. It shall be amply supplied with clean, wholesome water from springs, wells, or unpolluted streams. It shall be floored with a tight, solid floor of hard wood, or cement, or well joined stone. The yards, sheds and close pens shall be dry, and free from mud and filth, and their sides or walls shall be thoroughly whitewashed at least twice each year. All its apparatus shall be kept in a neat and orderly manner, and free from offensive smells. When the slaughtering for the day is completed, the sides and floor of the slaughter room shall be thoroughly washed with an abundance of clean water. No other disinfectant will be required. No animal matter of any kind shall be permitted to remain in, under, or near the slaughter house to decompose or putrefy. When blood and offal, or immature animals are fed to swine on the premises, such arrangement shall be made that such material shall be speedily consumed. The blood of all slaughtered animals shall be conducted by a water-tight gutter to a water-tight trough in the hogyard. The offal and bodies of immature animals shall be thrown into a pen with a tight, dry floor, to be consumed at once by the swine; and all portions not consumed within twelve hours shall be removed from the pen, and be burned, buried or composted with fresh earth. When the blood or offal are not fed to swine on the premises, they shall be carried away each day in close tanks, or be converted into fertilizers, or otherwise utilized by some apparatus the gases from which shall be carried under the furnace and consumed. The fat, and all material from which fat or oil are to be extracted, shall be rendered within such a time after the slaughtering of the animals that no offensive odors shall arise from them, or from the process of rendering. Any person who shall violate any of the provisions of this section shall be fined not less than twenty-five dollars, nor more than one hundred dollars, or be imprisoned not less than five days, nor more than thirty days. And upon conviction thereof, all grants, licenses, or privileges contemplated herein, shall be immediately revoked and annulled.

The provisions of this section, so far as practicable, shall apply to so-called "knacker's," plants, or plants for the disposal of the bodies of dead animals, and to premises used for the killing and shipment of poultry.

DISEASED ANIMALS.

SEC. 37. Every person owning, or having the care or custody of any animal which he shall know, or have reason to suspect, is affected with glanders, farcy, anthrax, or any other contagious or infectious disease dangerous to the public health, shall immediately isolate such animal from all other animals, and shall give notice thereof to the mayor the location of such animal. And no person having the care or custody of, or owning any animal affected with, or which there is good reason to believe is affected with, such disease, shall lead, drive, or permit such animal to go on or over any public grounds, uninclosed land, or on any street, public highway, lane or alley; nor permit it to drink at any public water trough, pail or spring; nor keep such diseased animal in any enclosure in or from which such diseased animal may come in contact with, or close proximity to, any animal not affected with such disease. And an animal will be deemed as "suspected" when it has stood in a stable with, or been in contact with, an animal known to have any of said communicable diseases, or if placed in a stable, yard or other enclosure where such diseased animal has recently been kept. Whenever an animal affected with any of the diseases herein named shall die, or shall be killed, the body of such animal shall be immediately burned, or buried not less than four feet deep, without removing the hide from the carcass. All bedding, litter, excrement, etc., that have accumulated about such animal, together with all blood, or other fluid elements that have escaped from it shall be burned. Dirt floors of stables wherein such animal has been kept shall be removed to the depth of four inches and burned. Everything about the stable, combs, brushes, or any post or fence where it has stood, and every part of harness or wagon used with such animal, and the stable where it has been kept, shall be thoroughly disinfected under the direction of a duly qualified veterinary surgeon. Whenever the owner, or person having in charge any animal declared by the State Veterinary Surgeon or other authorized person to have the glanders, shall neglect or refuse to destroy said animal, the premises whereon such animal is kept shall be quarantined until such animal is destroyed, and the premises thoroughly disinfected. And any person who shall neglect, or refuse, to obey any of the provisions of this section shall be fined not less than twenty-five dollars, nor more than fifty dollars, for each diseased animal, and for each day of such refusal, and for all damages that may result therefrom.

SEC. 38. The "quarantine" shall be construed to mean the perfect isolation of all diseased or suspected animals from contact with healthy animals; as well as the exclusion of such healthy animals from the yards, stables, enclosures or grounds wherever said suspected or diseased animals are, or have been kept.

SEC. 39. So-called "piggy" or pregnant sows and rejected cattle found in railway or packing-house stock yards must not be sold nor delivered to farmers, but held subject to such quarantine as may be deemed necessary to prevent the communication of any contagious disease.

- SEC. 40. The flesh of pregnant animals must not be sold nor used for human food after the seventh month of pregnancy for cows, and the tenth week for sows.

NUISANCES.

SEC. 41. (1) No privy vault, cesspool, nor reservoir into which a privy, water closet, stable or sink is drained, except it be water-tight, shall be established nor permitted within 100 feet of any well, spring, or other source of water used for drinking or culinary purposes.

(2) All privy vaults, reservoirs, or cesspools named in Rule 1, must be cleaned out at least once each year; and from the first day of May to the first day of November of each year shall be thoroughly disinfected by adding to the contents thereof twice each month two pounds of copperas, dissolved in a pail of water, or the contents be thickly covered with fresh lime.

(3) No privy vault nor cesspool shall open into any stream or ditch, nor into any drain except common sewers.

(4) All sewer drains that pass within 100 feet of any source of water used for drinking or culinary purposes shall be water-tight.

(5) No sewer drain shall empty into any lake or pond, nor into any cesspool or abandoned well.

(6) No offal or waste from any creamery shall be thrown upon or into any stream, ravine, open ditch or drain.

(7) No house offal or dead animal shall be left upon any lot or land within this.....unless the same be buried. The carcass of all animals dead from an infectious or contagious disease shall be immediately burned. All cellars and outbuildings must be cleaned before the first day of May in each year.

(8) Between the first day of May and the first day of November no hogs shall be kept within the jurisdiction of this Board, except in pens with dry floors, or pens free from all filth and standing water. Cattle yards, barns and stables must be kept clean, and free from all filth and offensive odor.

A violation of any of the provisions of this section shall be deemed to be the commitment of a nuisance.

GENERAL PROVISIONS.

SEC. 42. It shall be the duty of every police officer who has any knowledge of, or has good reason to believe, that any of the provisions of this ordinance is being violated, to make report of same through his chief to the health officer of the local board of health.

SEC. 43. Any citizen who has reason to believe that any of the provisions of this ordinance is being violated may file an information under oath, describing the person and the offense charged, and it shall be the duty of the attorney of the.....forthwith to prosecute the same before the proper court.

SEC. 44. If any person by himself, or by his agent or employe, shall wilfully violate any of the provisions of this ordinance, where no other penalty is provided, he shall be fined not less than \$10, nor more than \$100, or be imprisoned not less than three days, nor more than thirty days, in the discretion of the court.

SEC. 45. This ordinance shall take effect and be in force on and after its publication.

NOTICE TO LOCAL BOARDS.

This ordinance, or any portion thereof, may be adopted as regulations of a local board of health of a city or township, so far as applicable, except that local boards of health, under the statute, have no power to affix penalties to regulations, that power being vested in the legislature which has already provided a penalty for violations of regulations of local boards of health in section 2573 of the code, so that when any of these regulations are adopted by a local board of health, whether it be of a city, town or township, the penalties must be omitted. And in the event of a violation of them it is only necessary to prosecute under the statute, the penalty being already fixed.

The distinction is this: That cities and towns, under the law of municipal corporations, have power to provide penalties with ordinances, while local boards of health, whether in cities, towns or townships, have not, as they exist under a general statute.

The following "form" is printed by the Board on a sheet 16x28 inches, and is to be posted in at least five public places in the township, unless printed in some newspaper published or circulated in the township. It will be furnished upon application, free of charge, by the Secretary. Ask for form 28 B:

RULES AND REGULATIONS OF THE BOARD OF HEALTH.

Adopted and published by the Board of Health of the township of, and which will be strictly enforced by the board.

NUISANCES.

RULE 1. No privy vault, cesspool, nor reservoir into which a privy, water-closet, stable or sink is drained, except it be water-tight, shall be established nor permitted within one hundred feet of any well, spring or other source of water used for drinking or culinary purposes.

RULE 2. All privy vaults, reservoirs, or cesspools named in Rule 1 must be cleaned out at least one each year; and from the first day of May to the first day of November of each year, shall be thoroughly disinfected by adding to the contents thereof twice each month two pounds of copperas, dissolved in a pail of water, or the contents be thickly covered with fresh lime.

RULE 3. No privy vault nor cesspool shall open into any stream or ditch, nor into any drain except common sewers.

RULE 4. All sewer drains that pass within one hundred feet of any source of water used for drinking or culinary purposes shall be water-tight.

RULE 5. No sewer drain shall empty into any lake or pond, nor into any cesspool or abandoned well.

RULE 6. No offal or waste from any creamery shall be thrown upon or into any stream, ravine, open ditch or drain.

RULE 7. No house offal or dead animal shall be left upon any lot or land within this township unless the same be buried. The carcass of all animals dead from an infectious or contagious disease shall be immediately burned. All cellars and outbuildings must be cleaned before the first day of May in each year.

RULE 8. Between the first day of May and the first day of November no hogs shall be kept in any village within the jurisdiction of this board, except in pens with dry floors, or pens free from all filth and standing water. Cattle yards, barns and stables must be kept clean, and free from all filth and offensive odor. This board will order the removal of nuisances at any time when they appear to be detrimental to the public health.

CONTAGIOUS DISEASES.

RULE 9. It shall be the duty of every physician residing or practicing within the limits of this township to give written notice to the clerk of the board of any case of Asiatic cholera, smallpox, diphtheria, (membranous croup), scarlet fever (scarlatina, scarlet rash), typhoid fever, measles or whooping cough, that he may be called to attend professionally, within twenty-four hours after he shall first visit and ascertain the character of any such disease named herein. In all cases where no physician is in attendance, it shall be the duty of any person having charge of, or being at the head of a family or having the care or custody of any lodging rooms to give notice in like manner as required of physicians. Every school teacher and school officer who discovers, or who has knowledge of a case of these contagious diseases, shall cause the fact to be immediately reported to the local board of health.

RULE 10. It shall be the duty of the clerk of the board upon receiving written notice of the existence of a case of Asiatic cholera, smallpox, diphtheria, (membranous croup), scarlet fever, (scarlet rash, scarlatina), to forthwith quarantine the premises, by serving written notice to the occupants thereof, and placing a danger card thereon; and take such measures as may be necessary and proper for the restriction and suppression of such disease; and to investigate all the circumstances attendant upon the occurrence of the same. He shall also make proper provision for care of the sick. Where the disease is measles or whooping cough, the premises shall not be quarantined, but they shall be placarded with the danger card.

And it shall be the further duty of the clerk to disinfect, or cause to be disinfected, the premises whereon such quarantined diseases have occurred, together with all infected furniture, bedding, clothing and other articles, as provided by regulations of the State Board of Health.

RULE 11. If any person shall wilfully or maliciously remove or deface, or cause to be removed or defaced, any signal of danger, or cloth or card placed upon the quarantined premises, without the proper authority as provided herein, he shall be prosecuted as provided by law.

RULE 12. During the existence of any contagious or infectious disease in any family or household, or place, in this township, and until after the recovery of the sick and the disinfection of the premises where such disease shall have existed, no person residing in such household, family or place, shall be permitted to attend any public meeting without written permission from the clerk; and no superintendent, teacher or officer of any

school shall permit any child or person from any such family, household or place, to attend any school without a permit from the clerk, upon the recommendation of the attending physician, showing thorough disinfection of the person, clothing and premises. School teachers who are boarding in a family where there is an outbreak of contagious disease must at once change their place of boarding and lodging, and change and disinfect their clothing.

QUARANTINE.

RULE 13. Quarantine shall be deemed to be:

1. The placing of a cloth or card not less than eighteen inches square, having imprinted thereon in large letters the word "Quarantine," the name of the disease, and the words: "No person shall be permitted to enter or leave these premises except as provided by law, while it is quarantined, under the penalty provided by law."

2. Separation of the sick from all persons except those in actual attendance.

3. That no person shall leave said premises except the attending physician, without a permit therefor signed by the clerk and countersigned by the health officer.

4. That no article that has been used on or about a person sick with a contagious or infectious disease shall be removed from the sick room, nor from the premises, until the same has been properly disinfected.

RULE 14. Nurses who have been employed to care for persons sick with contagious disease may be released from quarantine when their services are no longer required, upon the order of the township clerk. Before leaving the premises there must be thorough disinfection of their person and clothing.

RULE 15. Isolation means the complete exclusion of all other persons from the sick except the nurse and attending physician; that the nurse shall be restrained from going to and from the premises, or mingling with the family; that all well persons shall be prevented from contact with bedding, clothing, food, or other articles that have been used on or about the sick. Where from necessity the parents or family are nurses, the isolation and quarantine apply to them.

RULE 16. Quarantine shall be established and maintained in each and every case for the period named herein, to-wit:

Scarlet Fever (Scarlatina, scarlet rash).—Thirty-five days.

Diphtheria (Membraneous croup).—Thirty-five days.

Smallpox.—Forty days.

Asiatic Cholera.—Twenty-one days.

RULE 17. When a family is quarantined for diphtheria, the head of the family, or bread-winner, may at the discretion of the local board, have the privilege of attending to his regular business, and of going to and from his house only when complying with the following conditions, and the clerk shall issue a permit therefor:

First.—He shall change his clothing before going to and leaving his home to go to his place of business.

Second.—He shall wash his hands, face, head and beard with a two per cent solution of carbolic acid, each time before leaving his home to go to his place of business.

Third.—While in the house he shall not act as nurse or live in the same room with the sick person.

Fourth.—He shall not attend any public meeting, or attend any place where persons are congregated.

Fifth.—This privilege shall not be granted to school teachers, nor to any person whose business brings him in intimate contact with children.

RULE 18. Whenever there is complete recovery or death of persons who have been sick with a contagious disease, and there are no further exposures thereto, the quarantine may be released, although the period prescribed herein has not elapsed. *Provided*, that no release of quarantine shall be permitted until at least seventeen days after the recovery of the last case, and proper disinfection of person and premises is made as herein after provided.

RULE 19. After death or recovery of persons sick from a contagious or infectious disease, the room, furniture, and other contents not to be destroyed, shall be thoroughly disinfected in accordance with regulations made by the State Board of Health.

RULE 20. No order for the release of quarantine shall be made by the clerk, except upon a report from the attending physician stating the number of persons on the quarantined premises sick with the infectious diseases in question, their name, age, and when the disease first appeared in each case, when recovered, and the means, if any, used for disinfection. If the clerk shall find that the regulations of the local board and of the State Board of Health respecting quarantine and disinfection have been complied with the quarantine shall be forthwith released. If quarantine regulations have been complied with, and proper disinfection has not been done the clerk shall order it done under the supervision of the health officer or some other competent person and the quarantine shall be continued until it is done.

RULE 21. No person shall give, lend or sell, or offer for sale any clothing or other articles liable to convey infection of any contagious disease unless the same have been disinfected and such disinfection approved by the clerk of the local board.

RULE 22. When Asiatic cholera, smallpox, diphtheria (membranous croup,) scarlet fever (scarlatina, scarlet rash), typhoid fever, measles, or any other contagious disease exists in any house or a dwelling place of a dealer in, or seller of milk, he shall discontinue, and cease to give, or sell, or distribute milk to any person, or to creameries or butter factories, or in anywise handle such milk, until a permit is granted therefor by the clerk, countersigned by the health officer. And no person who attends cows, and does the milking, or who has care of milk vessels, or the sale or distribution of milk, shall be permitted to enter any premises or place wherein exists any of the diseases named herein, nor have any communication, direct nor indirect, with any person who resides in, or is an occupant of such infected place; nor shall any milk or butter be given away, sold or distributed from such infected place. And any person, either as principal, agent, or employe, who shall violate any of the provisions of this rule shall be prosecuted according to law.

THE DEAD.

RULE 23. A body dead from smallpox must be immediately wrapped in a cloth saturated with the strongest disinfectant solution, without previous washing and buried deep, and no body dead from this disease shall under any circumstances, or any lapse of time, be disinterred.

RULE 24. The body of a person who has died from Asiatic cholera, yellow fever, leprosy, diphtheria (membraneous croup), scarlet fever (scarlatina or scarlet rash), must not be removed from the sick room until it has been wrapped in a cloth saturated with a solution of corrosive sublimate (one ounce to six gallons of water), and then tightly enclosed in a coffin. The body shall then be buried immediately without the attendance of any person other than is necessary for the interment thereof.

RULE 25. No public funeral shall be held of any person who has died from either of said diseases named in Rule 23 and 24, and no public funeral shall be held in a house, nor on any premises where there is a case of, nor where a death has recently occurred from either of said diseases.

RULE 26. No person, company, corporation or association having charge of or control of any schoolhouse or church, or of any building, room or place used for school or church purposes, or for any public assembly, shall permit the body of any person dead from any of the contagious or infectious diseases named in these regulations, or any other dangerous contagious disease, to be taken into such schoolhouse, church, building, room or place, for the purpose of holding funeral service over such body; and no sexton, undertaker or other person having charge of or direction of the burial of any body dead from any of the said diseases, shall permit the coffin or casket containing such body to be opened in the presence of any child, nor shall any child be permitted to act as pallbearer or carrier at any such funeral.

BURIALS.

RULE 27. Upon the death of any person within the limits of this township it shall be the duty of the physician who was attending at the time of death, or of the coroner, when the case comes under his official jurisdiction to furnish within twenty-four hours after such death, to the undertaker, or other person superintending the burial of said decedent, a certificate setting forth the full name, age, sex, color, place of death, date and cause of death, and such other facts as may be required by regulations of the State Board of Health and the statutes of the State of Iowa. If any person shall die without the attendance of a physician, or if the physician who did attend the decedent at the time of death shall neglect or refuse to give such certificate as aforesaid, it shall be the duty of the undertaker, or of any person acquainted with the facts, to report the same to the health officer of the local board of health, who is hereby authorized to give a certificate of death as aforesaid, *provided*, it be not a case requiring the attendance of a coroner.

RULE 28. No sexton or other person or persons, having charge or control of any cemetery, burying place or tomb or vault within the limits of this township, or under the control of this township, and no undertaker, or other person or persons, shall inter, entomb, or place in any vault, within the limits of this township the dead body of any person, or remove such body from or out of the township without having procured a certificate of death as herein provided; and it shall be the duty of any undertaker or other per-

son or persons having charge of the burial or removal of the dead body of any person to deliver said certificate of death forthwith to the clerk of the local board of health.

RULE 29. It shall be the duty of the clerk upon the presentation of a certificate of death, to issue a permit to inter, entomb, or place in a vault the body of the deceased person named in such certificate. *Provided*, a body dead from diphtheria (membranous croup), scarlet fever (scarlatina, scarlet rash), smallpox, Asiatic cholera or leprosy shall not be deposited in a receiving vault.

RULE 30. If any physician, or any other person within the limits of this township, shall knowingly attempt to secrete, or withhold the true character of any of the contagious or infectious diseases specified in these regulations, or shall in any manner whatsoever attempt to deceive or defraud, or who shall make any false statement in making a certificate of cause of death, by giving any other than the true cause of such death; or, if the decedent was affected with any of such contagious or infectious diseases during his last sickness, he shall neglect or refuse to state such fact in such certificate, he shall be liable to the penalty prescribed in section 2573 of the code.

RULE 31. Upon the presentation of the proper application in accordance with the regulations made by the State Board of Health for the removal of the dead body of a human being out of the limits of this township, it shall be the duty of the clerk of the local board of health to issue a permit countersigned by the president for such removal. *Provided*, that where said body is to be disinterred such application must be accompanied with a disinterment permit from the State Board of Health, but no permit for such removal shall be granted in any case of a body dead from Asiatic cholera, smallpox, leprosy or yellow fever, or from any sequelæ or complications of said diseases. Bodies dead from diphtheria, (membranous croup), scarlet fever, (scarlatina, scarlet rash), may be disinterred upon a permit issued by the State Board of Health. No permit for such removal shall be granted in any case whatsoever where the cause of death was a contagious or infectious disease, or any sequelæ of such disease, unless the permit be approved and signed by the president of the local board of health, nor shall a permit be granted except upon the presentation of the proper certificate of the cause of death.

DISEASED ANIMALS.

RULE 32. Every person owning, or having the care or custody of any animal which he shall know, or have reason to suspect, is affected with glanders, farcy, anthrax, or any other contagious or infectious disease dangerous to the public health, shall immediately isolate such animal from all other animals, and shall give notice thereof to the local board of health of the location of such animal. And no person having the care or custody of, or owning any animal affected with, or which there is good reason to believe is affected with, such disease, shall lead, drive, or permit such animal to go on or over any public grounds, uninclosed land, or on any street, public highway, lane or alley; nor permit it to drink at any public water-trough, pail or spring; nor keep such diseased animal in any enclosure in or from which such diseased animal may come in contact with, or close

proximity to, any animal not affected with such disease. And an animal will be deemed as "suspected" when it has stood in a stable with, or been in contact with, an animal known to have any of said communicable diseases; or if placed in a stable, yard or other inclosure where such diseased animal has recently been kept. Whenever an animal affected with any of the diseases herein named shall die, or shall be killed, the body of such animal shall be immediately burned, or buried not less than four feet deep, without removing the hide from the carcass. All bedding, litter, excrement, etc., that have accumulated about such animal, together with all the blood, or other fluid elements that have escaped from it shall be burned. Dirt floors of stables wherein such animal has been kept shall be removed to the depth of four inches and burned. Everything about the stable, combs, brushes, or any post or fence where it has stood, and every part of harness or wagon used with such animal, and the stable where it has been kept, shall be thoroughly disinfected under the direction of a veterinary surgeon. Whenever the owner or person having in charge any animal declared by the State Veterinary Surgeon or other authorized person to have the glanders, shall neglect or refuse to destroy said animal, the premises whereon such animal is kept shall be quarantined until such animal is destroyed, and the premises thoroughly disinfected.

RULE 33. The "quarantine" shall be construed to mean the perfect isolation of all diseased or suspected animals from contact with healthy animals; as well as the exclusion of such healthy animals from the yards, stables, enclosures, or grounds wherever said suspected or diseased animals are, or have been kept.

RULE 34. So-called "piggy" or pregnant sows and rejected cattle found in railway or packing house stock yards must not be sold or delivered to farmers, but held subject to such quarantine as may be deemed necessary to prevent the communication of any contagious disease.

RULE 35. The flesh of pregnant animals must not be sold or used for human food after the seventh month of pregnancy for cows, and the tenth week for sows.

PUBLIC SCHOOLS.

RULE 36. Persons afflicted with diphtheria (membranous croup), measles, rotheln, mumps, scarlet fever (scarlatina, scarlet rash), whooping cough, or smallpox, must be excluded from school until upon a certificate from the attending physician, showing complete recovery, thorough disinfection of his or her person and clothing, and the disinfection of the home, the clerk issues a written permit for their re-admission. All other persons from families where such diseases exist, shall also be excluded from the schools until they are furnished with a permit as above required.

RULE 37. Every school teacher who discovers among his or her pupils, a case of these contagious diseases must immediately report the fact to the clerk; also to the superintendent or principal of the school, and to the parents of the children, and must send the pupils thus afflicted to their homes at once. Teachers must not visit premises wherein are children sick with any contagious disease, and must carefully avoid exposure to such diseases.

RULE 38. If a person is ascertained to have attended school when affected with any of these contagious diseases the room wherein such person attended shall be immediately closed and properly disinfected.

SLAUGHTER-HOUSES.

RULE 39. No slaughter-house shall be erected or used within the limits of this township unless a permit from the local board of health has first been obtained, with the advice and assent of the health officer, and no slaughter-house shall be erected, or used, within 320 feet of any public highway, or within 600 feet of any dwelling house, schoolhouse or church, or any building used for church purposes. It shall be erected on dry, hard land, that can be well drained. It shall be amply supplied with clean, wholesome water from springs, wells or unpolluted streams. It shall be floored with a tight solid floor of hard wood, or cement, or well jointed stone. The yards, sheds and close pens shall be dry, and free from mud and filth, and their sides or walls shall be thoroughly whitewashed at least four times each year. All its apparatus shall be kept in a neat and orderly manner, and free from offensive smells. When the slaughtering for the day is completed, the sides and floor of the slaughter-room shall be thoroughly washed with an abundance of clean water. No other disinfectant will be required. No animal matter of any kind shall be permitted to remain in, under, or near the slaughter-house to decompose or putrefy. When blood or offal, or immature animals are fed to swine on the premises, such arrangement shall be made that such material shall be speedily consumed. The blood of all slaughtered animals shall be conducted by a water-tight gutter to a water-tight trough in the hog yard. The offal and bodies of immature animals shall be thrown into a pen with a tight, dry floor, to be consumed at once by the swine; and all portions not consumed within twelve hours shall be removed from the pen, and be burned, buried or composted with fresh earth. When the blood or offal are not fed to swine on the premises, they shall be carried away each day in close tanks, or converted into fertilizers, or otherwise utilized by some apparatus the gases from which shall be carried under the furnace and consumed. The fat, and all material from which fat or oil is to be extracted, shall be rendered within such a time after the slaughtering of the animals that no offensive odors shall arise from them, or from the process of rendering.

This rule, so far as practicable, shall apply to so-called "knacker's" plants or plants for the disposal of the bodies of dead animals, and to premises used for the killing, and shipment of poultry.

RULE 40. Rules and regulations of the State Board of Health, and of this board shall be enforced by the clerk, and all public officers of the township are hereby commanded and enjoined to aid and assist the clerk in the enforcement thereof.

-----Clerk.

-----Chairman.

Dated.....18....

CIRCULAR NO. 2.

INSPECTION OF ILLUMINATING OILS AND LINSEED OIL.

RULES AND REGULATIONS.

KEROSENE OIL.

RULE 1. *The instruments.*—The instrument to be used in testing oil under the provisions of chapter 11, title 12, the code, shall be that made by Elmer & Amend, New York, and shall have inscribed thereon the words: "Oil Tester, Iowa State Board of Health," and shall be constructed as shown in the following diagram:

Fig. 1 represents the instrument entire. It consists of a sheet copper stand $8\frac{1}{2}$ inches high exclusive of the base, and $4\frac{1}{2}$ inches in diameter. On one side is an aperture $3\frac{1}{2}$ inches high for introducing a small spirit lamp, A; or, better, a small gas burner, instead of a lamp, when gas is available.

The water-bath, Fig. 2, is also of copper, $4\frac{1}{2}$ inches in height and 4 inches in diameter inside, provided with a flanged cover; the opening in the cover $2\frac{1}{2}$ inches in diameter. The flange, which supports the bath in the cylindrical stand, is one-fourth inch projection. The capacity of the bath is about 20 fluid ounces, which is indicated by a mark on the inside.

Figure 3 represents the oil-cup, which is also of copper. The section below the flange is $3\frac{1}{2}$ inches high and $2\frac{1}{2}$ inches in diameter. The section above the flange is 1 inch high and $3\frac{1}{2}$ inches in diameter, and serves as the vapor chamber. A small flange at the upper rim serves to hold the cover, which is of glass, in place.

Oil Tester.

To prevent reflection from the

otherwise bright surface of the metal, the inside is blackened by forming a sulphide of ammonia. The capacity of the oil-cup is about ten fluid ounces, when filled to one-eighth of an inch of the flange which joins the oil-cup and the vapor chamber.

The cover of the oil-cup, C, is of glass, $3\frac{1}{4}$ inches in diameter; is perforated on one side with a circular opening, which is filled with a cork, through which passes the thermometer, B. On the rim is another oval opening three-fourths of an inch deep, and the same in width, through which is to be passed the flashing jet in testing. The glass cover is used instead of metal, that the operator may more readily note the exact point at which the flash occurs. A small gas jet one-fourth of an inch in length is the best for igniting the vapor. Where gas cannot be had, and to prevent the frequent discrepancy in tests made by different inspectors of the same oil at different places, owing largely, if not entirely, to the difference in their torches, and to obviate the frequent annoyance from that fact, and from smoke from waxed threads filling the vapor chamber of the cup, thereby preventing an accurate and reliable test, a portable gas torch has been devised, which inspectors in this State are required to procure and use for testing products of petroleum.

RULE 2. *The flash test.*—The test shall be made as follows:

Remove the oil-cup and fill the water-bath with cold water to the mark on the inside. Place the oil-cup in the water-bath, and fill it with oil to within one-eighth of an inch of the flange. Care must be taken that oil does not flow over the flange. Remove all air bubbles with a piece of blotting paper. Place the glass cover on the oil-cup and adjust the thermometer so that its bulb shall be entirely covered by the oil.

Apply the apparatus for heating the water-bath, and so adjust the flame that the degree of heating will *not exceed* 2° per minute.

When the temperature of the oil has reached 90 degrees Fahrenheit, the test should commence by inserting the torch, which should have a very small flame, into the oval opening in the glass cover, passing it in at such an angle as to have the flame about three-eighths of an inch above the oil, and reaching near the center of the vapor chamber.

The motion must be steady and uniform, rapid, and without any pause. This must be repeated at every 2 degrees' rise in the thermometer until 100 degrees is reached, when the torch must be applied at each degree of temperature until 105 degrees is reached. Great care must be exercised to secure accuracy at this point, and to this end the torch must be applied just before the temperature reaches the 105 degree point. If no flash is shown at this point continue the test at each two degrees' rise until the flashing point is reached, which is indicated by the appearance of a slight bluish flame on the surface of the oil. The lowest point at which this vapor flame appears on the surface of the oil, and a perceptible flash is produced, is to be designated as the flashing point. The temperature of the oil must be noted before the torch is applied. The flame of the torch must not touch the oil or come within three-eighths of an inch of its surface. Oil that flashes at 105 degrees, or below that, must be rejected.

As cold oil will expand by heating, care must be taken that it does not rise so as to flow over or on the flange or shoulder of the oil cup. That part of the oil cup comprising the vapor chamber and the flange must be dry

and entirely free from oil. All air bubbles must be removed from the surface of the oil; this can be done with ordinary blotting paper. The water-bath cup must be filled with cold water for each separate test, and the oil in the cup brought to a temperature of 60 to 65 degrees before the lamp is placed under the water-bath. The oil cup must be carefully and thoroughly wiped dry of oil from the previous test. The flame of the torch must not exceed one-eighth of an inch in length or size.

RULE 3. *For testing 300 degrees.*—The instrument to be used for testing oils which come under the provisions of section 2508 of the code, shall consist of the cylinder shown in Figure 1 of the diagram, the copper oil cup, shown in Figure 3, the copper collar, D, for suspending the oil cup in the cylinder, and an adjustable wire support for suspending the thermometer in the oil.

RULE 4. To ascertain the igniting and burning point the test should be made as follows:

Fill the cup with the oil to be tested to within three-eighths of an inch of the flange joining the cup and the vapor chamber above. Care must be taken that oil does not flow over the flange, by expansion from heating. Place the cup in the cylinder, covered with the collar D. Adjust the wire support so that the thermometer bulb, when supported thereon, will be just covered by the oil, the bulb also being near the center of the cup. Place the lamp or gas jet under the cup. Adjust the flame so that the degree of heating will not exceed ten degrees each minute until 250° Fahrenheit is reached, when the rate must not exceed 5° a minute above that point. The torch to be used must be the same as described in Rule 1, for obtaining the flash-point. Apply the torch lightly across and not less than three-eighths of an inch above the surface of oil at each 5° rise in the temperature, until the oil ignites and burns. The lowest point at which the oil will ignite and burn is to be taken as the burning point, and no oil which burns at a temperature below 301° Fahrenheit must be approved for the purposes set forth in section 2508. When approved, the package, cask, barrel, or vessel, containing the oil from which the oil tested was taken, must be branded with stencil No. 3, as provided in said section and Rule 7. The actual point at which the oil burns must be branded on the barrel. If it burns at 301° or below that, it must be rejected. In this test the water-bath cup and the glass cover are not used, the flame of the lamp being applied directly to the bottom of the oil cup.

RULE 5. *General rules.*—All instruments, testers, and thermometers to be used by inspectors must be approved by, and registered in, the office of the State Board of Health.

RULE 6. Inspectors must have all previous brands of tests removed from packages, casks, or barrels before affixing their brand thereon.

RULE 7. Brand No. 1 must be circular in form, not less than eight inches in diameter, outside measurement, with ample margin to protect the vessel or barrel from the stencil brush, and must contain the following words: "Approved, flash testdegrees, Iowa." And, also the name of the inspector, date of inspection, and degree of test. It must also be arranged for adjustable dates, and the degrees of test.

RULE 8. Brand No. 2 shall be square in form, not less than seven inches outside measurement, without date, and must contain the following words: "Rejected for illuminating purposes....., inspector, Iowa." It must contain the name of the inspector; it must be affixed to all packages, casks, cans, barrels or vessels containing kerosene which does not flash at a point above 105° F. It must also be affixed to all packages, casks, barrels or vessels containing gasoline, naphtha, or benzine.

Brand No. 3 shall be of like form and dimensions as brand No. 1, and shall contain the words: "For illuminating cars, approved (or rejected as the case may be).....degrees, Iowa.....
189.....Inspector." It shall have adjustable spaces for dates, degrees, and the words "approved" and "rejected." It must also contain the name of the inspector. No oil must be approved for illuminating cars that burns at a temperature below 301° F.

Stencil brands must conform to patterns, on file in the office of the Secretary of the State Board of Health.

RULE 9. The inspector's brand must be placed on the package, cask, or barrel, in clear, distinct letters, and must be affixed by the inspector in person, or by some person under his personal supervision and control, who is not directly, or indirectly, interested in the manufacture or sale of any product of petroleum. The brand of an inspector is deemed to be his official signature, and must not be permitted to pass out of his custody or control.

RULE 10. Upon the inspection of oil by an inspector, the inspector shall deliver to the owner of the oil, or the person for whom the inspection was made, a certificate of inspection, which shall be in the following form:

[FRONT.]

[PRESERVE THIS CERTIFICATE.]

.....189.....

REMOVED OF

as fees for the inspection of..... Barrels

ILLUMINATING OIL, under Chapter 11, Title XII, Code, as amended by Chapters 60 and 61, Laws Twenty-seventh General Assembly.

No

OIL INSPECTOR'S CERTIFICATE.

[STOP]

Total fees \$... — 100

No barrels approved.....

No. barrels rejected.....

Total No. barrels @..... Inspected.....

For whom inspected.....

Date of inspection.....

No. of certificate.....

.....**Inspector.**

[BACK.]

APPROVED TEST.

Brand of Oil.

Degrees.

REJECTED TEST.

APPROVED TEST.

Brand of Oil.

Degrees.

REJECTED TEST.

RULE 11. Where oil of different grades, or standards, is placed in receiving or storage tanks, an inspection must be made, and the actual standard of oil from such tanks obtained at all times before it is put into barrels for sale and use. There must be no average test, by taking an average of the different qualities or standards of oil before it is placed in such tanks. The inspector must know the quality and standard of the oil before he affixes his brand thereon. Where a number of barrels are filled consecutively from a tank, previously inspected, an inspection of one barrel would suffice for that particular lot of barrels, *provided*, no oil has been added to the tank during the process of filling the barrels. The barreling, testing and branding must constitute one transaction. There must be no lapse of time therein. The statute requires all products of petroleum, kerosene as well as gasoline, to be inspected and branded. The branding is notice to the public of the inspection. The statute makes no distinction in the form or size of the vessel in which such product is placed. It is no less imperative that when fifty gallons of kerosene are drawn from a tank into five 10-gallon cans that the cans shall be branded than that fifty gallons of kerosene taken from the same tank and put into a barrel be branded. When a product of petroleum to be used for illuminating purposes has been inspected, the fact of such inspection must be shown upon the vessel from which it is to be sold again or used. When inspected in a storage tank or tank-car, it need not be reinspected when barreled or canned, but the barrel, can or package must be branded according to the actual standard of the article contained therein. The barrel or vessel must not be branded before filling.

Empty barrels to be subsequently filled with gasoline may be branded with stencil Number Three, as "rejected for illuminating purposes."

RULE 12. Oil received from jobbers in barrels is frequently of various standards, and the actual standard cannot be ascertained except by a separate test of each barrel. There must be no average or cumulative tests. For instance: a sample of oil taken from five barrels of 102 degree oil and five barrels of 108 degree oil would give a mixture that would, when tested, cause the whole ten barrels to be rejected, whereas five barrels, separately tested, would have to be approved. Averages are not permissible in the inspection service. Every barrel must be tested.

RULE 13 Where oil is shipped into this state in barrels, or from one point in this state to another point in this state, that has not been lawfully inspected within this state, each and every barrel must be inspected, and the oil therein tested. The testing of one barrel will not authorize an inspector to brand the entire number as of the standard of the barrel tested.

The practice of jobbers in delivering oil to retail dealers without inspection is a direct violation of law. The delivery constitutes *prima facie* evidence of sale. A retail dealer receiving a lot of uninspected oil cannot justify himself for selling such oil on the ground that the jobber is responsible to the state for the violation of law. He must immediately notify the inspector that the oil is in his possession. Inspectors must exercise diligence to arraign offenders and stop the practice. They must, with strict impartiality, insist upon obedience to law in their respective districts.

RULE 14. Oil in transit must not be inspected outside of the district to which it is sent.

RULE 15. In case of a lamp explosion the inspector in whose district the accident occurred shall immediately investigate all the facts in connection therewith and report the same to the State Board of Health.

RULE 16. Inspectors must regard their duties as inspectors paramount to all other duties, and upon notification must perform them without delay.

RULE 17. No thermometer shall be used by inspectors for testing oil unless the same has been calibrated and tested for errors at the observatory at Yale college, and a certificate secured showing the results of the calibration. A copy of all such certificates shall be sent to the Secretary of the State Board of Health, and recorded in his office.

The law relating to the inspection of kerosene was amended by the Twenty-seventh General Assembly as follows:

Chapter 61. Appointment of Deputies.—SECTION 1. Amend section twenty-five hundred and three (2503) of the code by adding thereto the following:

“Where there are two or more inspection stations, under the jurisdiction of the same inspector, he may, with the approval of the governor, appoint a deputy or deputies, each of whom shall be a resident of the state and not interested directly or indirectly in the manufacture or sale of petroleum products, for all of whose official acts the principal shall be responsible, and who shall serve without additional compensation or expense to the state.”

MINERS' OIL.

The code has the following relative to the sale, use and inspection of miners' oil:

“**SECTION 2493. Purity of oil.**—Only pure animal or vegetable oil, paraffine, or electric lights shall be used for illumination purposes in any mine in this State, and for the purpose of determining the purity of oils the State Board of Health shall fix a standard of purity and establish regulations for testing said oil, and said standard and regulations, when so determined, shall be recognized by all the courts of the State.

“**SEC. 2494. Penalty.**—Any person, firm or corporation, either by themselves, agents or employes, selling or offering to sell for illuminating purposes in any mine in this State any adulterated or impure oil, or oil not recognized by the State Board of Health as suitable for illuminating purposes as contemplated in this chapter, shall be deemed guilty of a misdemeanor, and, upon conviction thereof, shall be fined not less than \$25 nor more than \$100 for each offense; and any mine owner or operator or employe of such owner or operator who shall knowingly use, or any mine owner who shall knowingly permit to be used, for illuminating purposes in any mine in this State any impure or adulterated oil, or any (*oil that has not been inspected and approved by an inspector), or any oil the use of which is forbidden by this chapter, shall upon conviction thereof, be fined not less than \$5, nor more than \$25.

* Parts in parentheses as amended by the Twenty-seventh General Assembly chapter 60.

(" SEC. 2. That section twenty-four hundred and ninety-five (2495) be stricken out and the following substituted therefor: 'It shall be the duty of an inspector of petroleum products to inspect and test all oil offered for sale, sold, or used for illuminating purposes in coal mines in this State, and for such purpose he may enter upon the premises of any person. If upon test and examination the oil shall meet the requirements made and provided by the State Board of Health, he shall brand, over his own official signature and date, the barrel or vessel holding the same with the words "approved for illuminating coal mines." Should it fail to meet such requirements, he shall brand it over his own official signature and date, "rejected for illuminating coal mines." All inspection shall be made within this State, and paid for by the person for whom the inspection is made at the rate of 10 cents per barrel or vessel; which charge shall be a lien on the oil inspected; and be collected by the inspector. Each inspector shall be governed in all things respecting his record, compensation, expenses, and returns to the Treasurer of State and Secretary of State as provided in sections 2506 and 2507 of the code. It shall be the duty of the inspector whenever he has good reason to believe that oil is being sold or used in violation of the provisions of this chapter to make complaint to the county attorney of the county in which the offense was committed, who shall forthwith commence proceedings against the offender in any court of competent jurisdiction. All reasonable expenses for analyzing suspected oil shall be paid by the owner of the oil whenever it is found that he is selling or offering to sell impure oil in violation of the provisions of this chapter. Such expenses may be recovered in a civil action, and in criminal proceedings such expenses shall be taxed as part of the cost.' ")

In pursuance with the provisions above quoted, the State Board of Health, at a meeting held May 11-13, 1898, adopted the following rules:

RULE 1. The specific gravity of oil used for illuminating purposes in coal mines must not exceed 22 degrees, Tagliabue hydrometer, at 60 degrees temperature, Fahrenheit.

RULE 2. All oil must be tested in a glass-footed cylinder, $1\frac{1}{2}$ inches in diameter and 8 inches deep.

RULE 3. Fill the hydrometer jar to within $\frac{1}{4}$ inch of the top, introduce the hydrometer, cool or heat as the case may be to 60 degrees Fahrenheit. Allow the hydrometer to come to rest, read from below, and the last line which appears under the surface of the oil should be regarded as the true reading, care being taken that the hydrometer does not touch the sides of the jar when reading.

RULE 4. Fill a round, clear glass bottle $\frac{3}{4}$ full with the oil and shake well; the bead should not show fluorescence similar to that of petroleum products.

RULE 5. Fill an ordinary miner's lamp with the oil, light and note character and quantity of smoke.

RULE 6. All material used for illuminating purposes in coal mines shall be free from smoke, bad odor, and by-products of resin, known as mystic oil.

RULE 7. Paraffine wax should not contain more than 3 per cent of oil, and the maximum melting point shall be 110 degrees, Fahrenheit. To test the melting point of paraffine wax, place a chip of it on hot water, then

allow the water to cool slowly, and note the temperature of the water when the wax globule loses its transparency.

RULE 8. In all cases of doubt, or question as to inspection, or as to the purity of the oil or paraffine to be used in mines, a sample of the same shall be furnished the State Board of Health for chemical analysis.

All oils, therefore, sold by dealers, or their agents, or furnished by mine owners, or operators; or used by miners in any of the coal mines of Iowa, for illuminating purposes, shall, previous to such use, have been duly inspected and branded by some district oil inspector, legally qualified by the State.

LINSEED OIL.

Chapter 52, laws of the Twenty-seventh General Assembly, relating to the sale of linseed (or flaxseed) oil, imposes new duties upon the State Board of Health and upon the oil inspectors of the State. Sections 4 and 5 relating to the "duties and powers of inspectors and Board of Health" and "the cost of analysis," are as follows:

SEC. 4. Duties and powers of inspectors and Board of Health.—It shall be the duty of the inspectors of petroleum products, under such rules and regulations as the State Board of Health may prescribe, to enforce the provisions of this act. The violation of any of the provisions of this act relating to the manufacture and adulteration of linseed or flaxseed oil is hereby declared to be a public nuisance, and any court of competent jurisdiction is authorized, upon application of the Board of Health or its agents, to enjoin such violation, in the same manner as injunctions are usually granted under the rules and practice of such court. The board, its inspectors, assistants, experts and chemists, and others appointed by it, shall have access, ingress, and egress to and from all places of business and buildings where linseed or flaxseed oil is kept for sale, stored or manufactured. They shall also have the power to open any tank, barrel, can or other vessel containing such oil, and may inspect the contents thereof, and take samples therefrom for analysis. All clerks, bookkeepers, express agents, railroad agents, or officials, employes of common carriers, or other persons, shall render them all the assistance in their power, when so requested, in tracing, finding or inspecting such oil.

SEC. 5. Cost of analysis.—It shall be the duty of the court in every action brought under this act to tax as costs in the cause, the actual and necessary expense of analyzing the linseed or flaxseed oil which shall be in controversy in such proceeding; provided, that the amount so taxed shall not exceed the sum of twenty-five (25) dollars. It shall be the duty of the county attorney, upon the application of the State Board of Health, to attend to the prosecution in the name of the State, of any suit brought for violation of any of the provisions of this act within his county.

REGULATIONS FOR THE USE OF KEROSENE AND GASOLINE.

Kerosene may be said to be the middle product of petroleum, the upper being several volatile hydro-carbons known under the general term of *naphtha*, a highly inflammable substance, and the lower of paraffine, heav-

ler and less combustible than kerosene. Naphtha is a very dangerous explosive. An excess of naphtha in kerosene renders the kerosene dangerous. An excess of paraffine makes the kerosene heavy and less combustible.

The statutes of Iowa demand that so much of the naphtha shall be removed that oil, when heated to a temperature of 105 degrees Fahrenheit, will not throw off a vapor which will ignite when in contact with a flame or lighted match. That is what is termed the flashing point. Extensive observation and experiment have demonstrated that this standard will give satisfactory results for illuminating purposes and be safe for use in ordinary lamps. It would not, however, be safe for kindling fires in the kitchen stove. No oil having a flashing point below 105 degrees can be lawfully sold or used for illuminating purposes in this State.

The flashing point should not be confounded with the burning point, or fire test, which signifies that degree of temperature or heat at which oil placed in an open vessel will ignite and burn without a wick. The fire test is not recognized by the Iowa statute, and has little or no value as determining the actual quality of the oil. Retail dealers should especially bear this in mind. Refiners and tank-line companies frequently brand oil "175 degrees Fire Test," "Head Light, 175 degrees," or other trade marks which have no relation whatever, under the law, to the actual quality of the oil. The brand of an Iowa inspector, indicating the flashing point, is to be deemed the actual quality and standard of the oil. The difference between the flashing and burning point of kerosene is 10 to 50 degrees, the average being 20 to 27 degrees, so that oil branded 175 degrees, Fire Test, should have a flashing point of 126 degrees. Hence, no person should be misled or deceived by the dealer who says an oil is 150 degrees or 175 degrees fire test. Look at the inspector's brand, get the degree of the flashing point there given, and add twenty-seven to it and you will have very nearly the actual fire test. The law interposes no inhibition against trade marks, except that no trade mark asserting a fraud can stand. The branding of oil 175 degrees Fire Test, that has a flash test below 126 degrees is clearly an attempt to defraud the purchaser.

The flashing and burning points are independent of each other. The flashing point depends upon the amount of naphtha or volatile substance present, while the burning point depends upon the general character of the whole oil. The addition of only 2 per cent of naphtha would not affect the burning point, while it would lower the flashing point 10 degrees. Hence the burning point or "fire test" is not deemed a reliable standard of safety.

The tendency of retail dealers is to purchase oil having a high flashing point, presumably on the theory that if oil having a flashing point of 106 degrees is safe, that of 126 degrees is so much safer. Theoretically that is true, but the higher the flashing point, the heavier the oil. Heavy oil congeals more or less in cold weather, will not rise freely, hence there is imperfect combustion. There is a limit to capillary attraction. Oil having a flashing point of 106 degrees to 110 degrees will give better illumination, burn freer and with greater satisfaction in ordinary lamps, than an oil with a flashing point of 120 degrees or 124 degrees.

Heavy or high grade kerosene has more or less paraffine, which tends to harden and clog the wick, and overheat the wick-tube. Such oil will not give good satisfaction in ordinary flat-wick lamps, and should be used only with burners and wicks especially adapted for heavy oil. The fire test of oil is made in an open cup. The flash test, under the Iowa law, is made in a closed cup.

It is proper here to say, for the benefit of retail dealers, that experiments made covering thousands of tests have shown that the average difference between the burning and flashing point of oil when both tests are made in the same cup, is from 20 to 27 degrees. The average difference between the flashing point of oil tested in an open cup, and the same oil tested in the Iowa (closed) cup is 25 to 30 degrees. The difference between the burning point of oil tested in an open cup and the flashing point of the same oil tested in the Iowa (closed) cup is from 50 to 55 degrees. Hence, commercial Headlight carbon oil, that has a burning point, or fire test, of 175 degrees tested as it always is by the refiner, in an open cup, should have a flashing point of 125 degrees (minimum) to 130 degrees when tested in the Iowa cup (closed). The specific gravity should not be above 45 degrees Baume at 60 degrees Fahrenheit.

If deficient in these requirements, as shown by the inspector's brand, a carbon oil cannot be deemed true commercial Headlight oil.

LAMPS.

Lamps should be of metal. Glass lamps should not be used in families where there are children. The bowl should be large in diameter, and shallow, not exceeding three inches in depth, so as to bring the flame as near the oil as possible, to secure an even combustion of all the contents. With deep lamps the wick will fail to raise the oil when half consumed; a crusted tube and over-heated burner, and deficient illumination is the result.

The base should be large and heavy, to prevent overturning.

They should be cleaned and filled every day, and once each week entirely emptied of their contents, to remove dregs and sediment.

When oil has been kept forty-eight hours in a half-filled lamp, a dangerous vapor forms. This will be released by the process of filling the lamp.

Never remove the top nor refill a lamp when burning.

Before lighting, turn the wick down even with the tube, and raise it gradually, from time to time, as the burner becomes heated.

Never blow down a chimney to extinguish a lamp. Turn the wick down until the flame flickers, then place your open hand behind the chimney top and give a quick puff of breath horizontally against your hand.

Do not fill a lamp to overflowing, as oil expands greatly as it becomes heated, and may rise up the wick tube and become ignited and dangerous.

During the day keep the lamp where the oil will not become warm. Never set it on a mantel over a fire-place, grate, or stove where there is a fire.

Never leave a lamp burning with the wick turned down. Air currents are liable to cause the chimney to break; the wick tube will then become greatly heated, and the lamp filled with dangerous vapor. A burning lamp with a broken chimney becomes liable to violent explosion in about fifteen minutes. A lamp should not be left burning at all in a vacant room or house. If a dim light is desired for a sick room, place the lamp in another

room burning at usual flame, leaving the connecting door ajar. Never leave a lamp turned low in a sick room, nor for a "night light." Several explosions have been caused by this practice. Let the flame be at usual height at all times when in use.

BURNERS.

The burner should be adapted to the oil to be used, whether heavy or light. It should be properly constructed for draft and ventilation for the escape of vapor from the vapor chamber of the lamp. It should burn without heating the burner—the cooler the better.

For heavy oil, a more liberal wick is required to raise the oil freely enough to supply the flame, hence two or more wicks are provided.

Burners should be kept perfectly clean inside and outside, and free from pieces of burned matches, charred wick, crustation on the wick tube, and accumulation of charred wick on the perforated disk. The disk is for the purpose of supplying draft and the necessary amount of oxygen of the atmosphere to consume the carbon of the oil. When the disk is clogged, imperfect combustion and smoke are the result.

Foul and ill kept burners are a more frequent cause of poor light than the oil.

To clean the wick turn it up even with the tube and rub the finger lightly across it to remove the charred surface.

Keep the vent-tube along the wick-tube into the lamp open and clean, as it is the safety valve of the lamp.

Gummed and clogged burners can be easily cleaned by boiling a few minutes in sal-soda or concentrated lye and water.

The important features of a lamp are safety, brilliancy of illumination, economy, cleanliness and durability. It becomes dangerous when the oil in a lamp is heated over 106 degrees. The space above the oil in a lamp in which the oil is unduly heated becomes filled with a highly explosive naphtha vapor. The higher the temperature of the oil, the more naphtha vapor is thrown off.

CHIMNEYS.

It is desired to impress upon the people that the chimney is an important factor in illumination. It is, in fact, a necessary part of the burner, as much as is a gear wheel of a machine. It is made for the burner. Every burner made is a patented device, and requires a special chimney to secure the intended perfect combination. Over two hundred shapes of chimneys are made. If your stove or fire-place smokes, the chimney is wrong. If your lamp smokes or smells, the chimney is wrong, not the lamp nor the oil. If the draft is right, and a chimney on the lamp it is made for, there is perfect combustion; no smoke, no bad odor. The top should be cylindrical in form to secure the best draft.

WICKS.

Probably not one person in one hundred gives a lamp wick thought or attention. Yet it is one of the most important factors in the burning of kerosene, as it is also one of the very probable causes of complaint of the unsatisfactory burning of oil. The markets are filled with cheap wicks, worthless and valueless at any price. Select a wick which will snugly fit

the tube, yet move freely when saturated with oil. If it binds in the tube draw a few threads from it lengthwise. It should only reach the bottom of the lamp, and should be changed each month, as from long use it becomes hardened and does not raise the oil freely.

SAFETY BURNING FLUIDS AND LAMPS.

The sale or use of so-called safety fluids, or of any oil for illuminating purposes, the product of petroleum, which has not been inspected in this state, and approved by a state inspector, is prohibited by law, except gasoline of 74 degree specific gravity may be used in the Welsbach Incandescent Lamp.

GASOLINE AND ITS DANGERS.

First.—Keep it in a well ventilated, cool place, inaccessible to children, never in any part of a dwelling.

Second.—No unclosed vessel, as a pitcher, basin or cup, containing gasoline, should be carried or placed within ten feet of a burning stove, lamp, gas or flame of any kind, or left standing in any room within a dwelling house.

Third.—Gasoline should never be poured from one vessel to another in any room in which there is a lighted lamp or a burning gas jet, an open grate burning, or within ten feet of a stove in which there is a fire, as the current of air in a room is always toward a fire or a burning lamp, and the vapor of gasoline will be carried in that direction and will ignite at a long distance.

Fourth.—It is dangerous to fill the reservoir of a stove when the burner is lighted, or near another stove in which a fire is burning. When not in use close the cut-off between the reservoir and burner. This will prevent overflow from defect or leakage at the burner. If there be an overflow of gasoline when filling the reservoir, or from the burner, wipe it carefully up before lighting the burner. If the overflow should become ignited smother it with a blanket or cloths. Do not throw water on it as that spreads the gasoline and increases the danger. Flour will squelch the flames quickly. This is true of the accidental ignition of any quantity of gasoline or kerosene. Keep the reservoir continually closed air tight.

Fifth.—If from leakage of a stove or vessel there is discovered an odor of gasoline in a room that has been closed, throw open the doors and windows until the air is changed before a match is struck or a flame of any kind is permitted therein.

Sixth.—Never kindle a fire with gasoline.

Seventh.—Keep gasoline in a tight vessel, and after drawing therefrom place the cap over the spout and close the neck and vent-tube if there be one. This will prevent evaporation of the fluid. It is from evaporation, filling the air with an explosive vapor, comes the danger.

Eighth.—Never attempt to clean gloves on the hand nor dresses with gasoline near a flame or stove. The fire from the stove will draw the vapor from the gasoline through the crevices and ignite it like a lightning flash. If gasoline is spilled upon your clothing remove the garment at once, keeping entirely away from flame of any kind. The deodorizing of gasoline for toilet use does not change its explosive nature.

CIRCULAR No. 15.

**DISINFECTION OF WOOLEN-RAG MATTRESSES, BED QUILTS,
CARPETS, RUGS AND UPHOLSTERED FURNITURE.**

The following rules and regulations for the instruction of the proprietors or managers of factories or stores devoted, in whole or in part, to the manufacture or sale of woolen-rag mattresses or bed quilts, and for the guidance of venders of second-hand upholstered furniture, bed clothing, carpets, rugs and mattresses, were duly adopted by the State Board of Health, November 4, 1898.

J. F. KENNEDY,
Secretary.

R. E. CONNIFF,
President.

RULES AND REGULATIONS.

It having come to the knowledge of the Iowa State Board of Health that the ordinary "wool" or rag bed quilts and mattresses manufactured in Iowa, or imported into the State and largely sold therein, are composed of unsanitary and often filthy materials, and, therefore, are a menace to the public health; further, that it is a fact that danger to the public health also lurks in the upholstered furniture, the carpets, the mattresses and bed clothing stored for sale in the numerous second-hand stores of our towns and cities; and further, as we have reason to believe that the present methods of carpet cleaning, as exemplified in the carpet-cleaning establishments of cities and towns, are also menaceful to the public health; therefore, the Iowa State Board of Health decrees the subjoined *rules*, devolving upon local boards of health in this State, through the health officers thereof, the duty of their early and strict enforcement.

RULE 1. The proprietors or managers of all factories or stores in Iowa, which are devoted, in whole or in part, to the manufacture of so-called woolen-rag bed quilts and mattresses, from and after the publication of these rules, are required to cause all rags collected for use in the aforesaid industry to be dusted, torn into small fragments and rinsed in clean water—preferably under a forcible hydrant stream—before they are used in the manufacture of the woolen-rag bed quilts and mattresses aforesaid; and when the completed article is ready to be put on the market, it shall, before being offered for sale, be thoroughly disinfected in the manner specified hereinafter. This rule as to the disinfection of completed woolen-rag mattresses and bed quilts shall also apply to such articles elsewhere manufactured and imported into, and put on sale in, the State of Iowa.

RULE 2. It is ordered: That all mattresses sent to mattress factories for renovation shall be subjected to thorough disinfection before being returned to their owners.

RULE 3. It is ordered: That all venders of second-hand upholstered furniture, bed-clothing, carpets, rugs and mattresses shall be required to disinfect such articles, in the manner hereinafter specified, before putting them on sale.

RULE 4. It is ordered: That all articles named hereinbefore, after having been disinfected in the manner specified hereinafter, shall, as evidence

of that fact, have securely attached to each one a label, on which is printed, in large type, these words: "Disinfected in accordance with the rules of the Iowa State Board of Health." Said label to be provided and attached at the expense of the manufacturer or vender, under the possible supervision of the local health officer.

RULE 5. It is ordered: That all carpets, rugs, etc., sent to a carpet-cleaning establishment for the purpose of being cleaned, shall be disinfected, after the dusting process has been completed, and in the following manner, to-wit: The carpets, rugs, or other articles that have thus been cleaned in the said carpet-cleaning establishment, shall at once be sprayed with a two-per-cent solution of formaldehyde, in the proportion of one fluid ounce of that agent to each square yard of carpet, rug or other article. Then, immediately, said article shall be tightly rolled and placed aside in a clean apartment, where it shall remain for at least ten hours undisturbed, before being returned to the owner. To each article thus disinfected, the label, prescribed in rule fourth, shall be attached, showing that the disinfection required by law, has been done. The local health officer shall exercise a general supervision over these carpet-cleaning establishments also.

RULE 6. For the information of those concerned, the subjoined explanation of the inexpensive apparatus and methods, necessary to be employed to carry into effect these rules, is now given. In mattress factories or second-hand stores a tight, pine board box, planed within, should be provided as a disinfecting chamber. It should be sufficiently large to hold a dozen mattresses, etc., at once. They should be separated by slat partitions, onto which the mattresses, etc., should be placed flatwise. In second-hand stores such a disinfecting chamber would hold a variety of upholstered furniture, on top of which mattresses or other articles of bed wear could be spread out.

Then a copper or tin receptacle, cylindrical shape and holding at least one-half gallon, having a screw top, *fitting absolutely air tight*, should be provided. A substantial metal support carries this receptacle or can and holds beneath it an alcohol lamp or other heating device. If an alcohol lamp, it should give a flame sufficiently large to spread over the entire bottom of the receptacle and hold not less than eight ounces. If other means of heating are used they must produce very rapid boiling of fluid in the receptacle. *Slow heat will not produce the required results.*

At or near the top of the apparatus is a metal tube connecting with the interior and fitted with a flexible rubber tube which terminates in a metal or hard rubber nozzle. The apparatus must be so made that it will not clog, or serious explosions may occur.

In one lower corner of the disinfecting chamber a small hole is bored through its wall. When the articles to be disinfected are well adjusted in the aforesaid chamber, place in the can the disinfecting agents—that is to say, one ounce of powdered borax to each pint of forty per-cent solution of formaldehyde (formaldehyde alone cannot be used). Such a can as that described above would hold four pints of formaldehyde and four ounces of powdered borax. The materials being thus placed in the can, fill the alcohol lamp with best alcohol, light and place it under the can. Introduce your metal or hard rubber tube into the hole bored in the box and then leave the apparatus to work for at least forty minutes after it commences to

boil. The formaldehyde will have become vaporized and will have filled the chamber. Then remove the tube from the chamber and tightly plug the hole, leaving the box undisturbed for at least twenty-four hours. The purpose had in view will then have been accomplished.

INFORMATION RESPECTING TUBERCULOSIS, OR PULMONARY CONSUMPTION.

Tuberculosis, or as it is more generally known, consumption, has existed from a very early period in the world's history. Owing to the prevalence of the disease, its insidious approach, its great fatality, its easy communicability, and its incurability, after the disease is once well established, it is necessary that the people of the State should be enlightened in regard to it.

It is an infectious disease, due to a germ, the bacillus tuberculosis. It is characterized by the presence of nodules, called tubercles, which may undergo certain changes—becoming cheesy, or hard and dense, and sometimes ulcerate, or in some instances become calcified—stony.

The scope of this circular will not permit an exhaustive examination of this part of the subject. Tuberculosis is the most universal scourge of the human race. It prevails more particularly in large cities, and wherever the population is massed together. It is estimated that in civilized countries, one-seventh of the deaths are due to this cause. It is very difficult to obtain accurate statistics in regard to it. In only a few countries can we obtain entirely reliable data, and from these we learn that it is the great scourge of the human race, and indeed it is not entirely confined to this race. Some animals seem especially prone to its ravages. Our cattle, that comprise so large a part of the wealth of the country, and contribute so much to the food we eat, are especially prone to the disease, rendering them unfit for food. Meat thus infected by the bacilli, should not be eaten at all. While thorough cooking would most probably destroy the germs, we know that most persons like their steaks rare, and if infected meat is so eaten, it becomes dangerous as an article of diet, and should be condemned.

The *milk*, also, is liable to infection in many ways. The food designed by the Creator for the young, the infirm and the aged, is thus rendered unfit for their use. It has been demonstrated that milk is a great carrier of contagion. It is very easily infected by the animal from which it is obtained. If tubercles exist in any part of the body, the milk is thereby rendered dangerous, whether obtained from a human being or from one of the lower animals. A tuberculous mother should never nurse her child, nor should milk from a tuberculous animal be given it. If the milker, or any one caring for it, is infected, it is rendered dangerous. The udder should always be cleansed before milking, and then the milk, received in vessels that have been scalded, should be strained through a sterilized cloth or other clean strainer. The stables should be well ventilated, no musty odors, nor foul-smelling gases should be permitted. The dairyman himself should be neat and clean. There is no other person in the community who so completely presides over the health and lives of ourselves

and our children as the man who supplies us with milk. The great bulk of the milk is collected from the small farmer, whose cattle are never inspected, and who is often the embodiment of carelessness if not of worse. The milk thus collected over wide areas is all turned into a common receptacle, and thoroughly mixed and distributed. How can our children be healthy? How is it possible for one of the dwellers in cities to escape?

The horse is not as liable to the disease as cattle. Rabbits and guinea pigs are especially liable to contract the disease, and, while not so often used for food, may be sources of infection to those coming in contact with them.

Geographical position has very little influence in the spread or dissemination of the disease, though it is more prevalent in the temperate regions.

The *germs*, or bacilli, exist in great numbers in persons affected by the disease, and may be *thrown off in coughing*. They are found in nearly all the excretions of the body, of those infected, but by far the greater number exists in the sputum. Nuttall has shown that from one and a half to four and a third billions of tubercle bacilli are daily thrown off by an individual with moderately advanced pulmonary tuberculosis.

INFECTION: *By inhalation.* It has been shown that the expired air is not infective. Cornet has said, "The consumptive, in himself, is almost harmless, and only becomes harmful through bad habits." The virus is largely contained in the sputum, which, when dry, is disseminated in the form of dust, and constitutes the great medium for the transmission of the disease. If discharged into a handkerchief, it speedily dries, especially if it is put into the pocket or beneath the pillow. In the last stages of consumption, the patient is weak, the sputum is expelled improperly; pillows, sheets, handkerchiefs, etc., are soiled. If a male, the beard or mustache is smeared. Even in the hands of the cleanly, without especial precautions, such circumstances all tend to the production, around the patient, of a halo of infected dust, maintained by every process of bed making or cleaning, which includes the pernicious habit of "dusting." In the hands of the careless and dirty, the infectivity is, of course, greatly aggravated.

It attains its maximum of intensity where the filthy habit of spitting on the floor prevails, especially if it is carpeted.

All rooms frequented by persons suffering from tuberculosis, very soon become infected, and consequently dangerous, such as hospitals, jails, poor-houses, etc.; all such rooms where ventilation and disinfection are neglected are very dangerous, as proven by the great number of deaths of those who are confined in these poisoned abodes. Boats and cars on our great lines of travel, without great care being used, become veritable pest houses.

MEANS OF PREVENTION

Sunlight is one of the most powerful agents in destroying the tubercle bacilli. Avoid imperfectly ventilated dwellings, dark, damp, musty rooms. Let your dwellings be light, dry and well ventilated, with an abundance of sunlight. The *sputum* should always be kept moist. In all public places, spittoons partly filled with water, to which may be added some disinfectant (carbolic acid is recommended as among the best), should be freely distributed, and which all persons who spit should be required to use if necessary.

Spitting in the streets and in all public places should be prohibited. No child should even be allowed to sleep with a person suffering from tuberculosis, especially if of the pulmonary variety.

Persons suffering from tuberculosis should not drink out of the same cup used by other members of the family, and when traveling should carry his own cup, as the microbes will adhere to the cup in great numbers, and thus endanger others.

As most cities obtain their *water supply* from rivers whose waters are contaminated with sewage, all water for drinking purposes should be boiled before using, thus preventing typhoid fever, as well as tuberculosis. All *soiled clothing* from tuberculous patients should be thrown into a tub of water, to which some disinfectant has been added, preventing the *sputum* from drying and thus protecting the washerwoman, as well as all others exposed.

In regard to the registration and quarantine of these cases, there is great difference of opinion. New York has such a law, with stringent regulations, but they are as yet not very faithfully observed. The time is coming, and not in the far distant future, when the people, better educated in these matters, will demand legislation that will protect the living from the germs of the most dangerous, because most deadly, of all the diseases that affect the human race.

TRANSPORTATION OF CORPSES.

RULES.

The following rules for the transportation of corpses adopted by the American Conference of State and Provincial Boards of Health; by the American Public Health Association; by the American Association of General Railway Baggage Agents; by the National Funeral Directors' Association, and by several State Boards of Health, were adopted by the Iowa State Board of Health, at its meeting in November, 1897:

RULE 1. The transportation of bodies dead of smallpox, Asiatic cholera, yellow fever, typhus fever or bubonic plague is absolutely forbidden.

RULE 2. The bodies of those who have died of diphtheria (membranous croup), scarlet fever (scarlatina, scarlet rash), glanders, anthrax or leprosy, shall not be accepted for transportation unless prepared for shipment by being thoroughly disinfected by arterial and cavity injection with a proved disinfectant fluid, (b) disinfecting and stopping of all orifices with absorbent cotton, and (c) washing the body with disinfectant, all of which must be done by an embalmer holding a certificate as such approved by the State Board of Health. After being disinfected as above, such body shall be enveloped in a layer of cotton not less than one inch thick, completely wrapped in a sheet and bandaged, and encased in an air-tight zinc, tin, copper, or lead lined coffin, or iron casket, all joints and seams hermetically soldered, and all enclosed in a strong, tight wooden box. Or, the body being prepared for shipment by disinfecting and wrapping as above, may be placed in a strong coffin or casket, and said coffin or casket encased in

an air-tight zinc, copper or tin case, all joints and seams hermetically soldered, and all enclosed in a strong outside wooden box.

RULE 3. The bodies of those dead from typhoid fever, puerperal fever, erysipelas, tuberculosis, measles, or other dangerous communicable diseases, other than those specified in rules 1 and 2, may be received for transportation when prepared for shipment by filling cavities with an approved disinfectant, washing the exterior of the body with the same, stopping all orifices with absorbent cotton and enveloping the entire body with a layer of cotton not less than one inch thick, and all wrapped in a sheet and bandaged and encased in an air-tight coffin or casket, provided that this shall apply only to bodies that can reach their destination within forty-eight hours from time of death. In all other cases such bodies shall be prepared for transportation in conformity with rule 2. But when the body has been prepared for shipment by being thoroughly disinfected by an embalmer holding a certificate as in rule 2, issued by the State health authorities, the air-tight sealing may be dispensed with.

RULE 4. The bodies of those dead from diseases that are not contagious, infectious or communicable may be received for transportation when incased in a sound coffin or casket and enclosed in a strong outside wooden box, provided they reach their destination within thirty hours from the time of death. If the body cannot reach its destination within thirty hours from time of death it must be prepared for shipment by filling the cavities with an approved disinfectant, washing the exterior of the body with the same, stopping all orifices with absorbent cotton and enveloping the entire body with a layer of cotton not less than one inch thick, and all wrapped in a bandage and encased in an air-tight coffin or casket. But when the body has been prepared for shipment by being thoroughly disinfected by an embalmer holding a certificate as in rule 2, issued by the State health authorities, the air-tight sealing may be dispensed with.

RULE 5. In case of contagious, infectious or communicable diseases the body must not be accompanied by persons or articles which have been exposed to the infection of the deceased, unless certified by the health officer as having been properly disinfected; and before selling passage tickets agents shall carefully examine the transit permit and note the name of the passenger in charge, and of any others proposing to accompany the body, and see that all necessary precautions have been taken to prevent the spread of the disease. The transit permit in such cases shall specifically state who is authorized by the health authorities to accompany the remains. In all cases where bodies are forwarded under rule 2 notice must be sent by telegraph to the health officer at destination, advising the date and train on which the body may be expected. This notice must be sent by or in the name of the officer at the initial point, and to enable the health officer at destination to take all necessary precautions at that point.

RULE 6. Every dead body must be accompanied by a person in charge, who must be provided with a passage ticket and also present a full first-class ticket marked "corpse" for the transportation of the body, and a transit permit showing the physician's or coroner's certificate, name of deceased, date and hour of death, age, place of death, cause of death, and, if of a contagious, infectious or communicable nature, the point to which the body is to be shipped, and when death is caused by any of the diseases specified in

rule No. 2, the name of those authorized by the health authorities to accompany the body. The transit permit must be made in duplicate, and the signatures of the physician or coroner, health officer and undertaker must be on the original and duplicate copies. The undertaker's certificate and paster of the original shall be detached from the transit permit and pasted on the coffin box. The physician's certificate and transit permit shall be handed to the passenger. The whole duplicate copy shall be sent to the official in charge of the baggage department of the initial line, and by him to the Secretary of the State, or Provincial Board of Health of the State or Province from which said shipment was made.

RULE 7. When the dead bodies are shipped by express the whole original transit permit shall be placed upon the outside of the box and the duplicate forwarded by the express agent to the express agent and Secretary of the State or Provincial Board of Health of the State or Province from which said shipment was made.

RULE 8. Every disinterred body dead from any disease or cause shall be treated as infectious or dangerous to public health, and must not be accepted for transportation unless said removal has been approved by the State or Provincial health authorities having jurisdiction where such body is to be disinterred, and the consent of the health authorities of the locality to which the body is consigned has first been obtained; and all such disinterred remains must be enclosed in a hermetically sealed (soldered), zinc, tin or copper lined coffin or box.

At a meeting of the Iowa State Board of Health on May 11, 1898, the following regulations were adopted to carry into effect the foregoing rules:

TRANSPORTATION OF CORPSES.

First.—It shall be the duty of every funeral director, undertaker, or embalmer within this State who may desire recognition by transportation companies and common carriers, for the transportation of the bodies of human beings dead from diphtheria, scarlet fever, glanders, anthrax or leprosy, to conform to regulations made therefor by the State Board of Health, to-wit:

Second.—He may make application to the State Board of Health for a permit to prepare such bodies for transportation. Said application shall contain his full name, age and place of residence, and the certification of two legal physicians of good repute in the place where he resides.

He shall pass an examination before the State Board of Health at such time and in such manner as the Board may determine. Said examination shall comprise the following subjects:

- (a) The visceral anatomy and vascular system of the human body.
- (b) The comparative value and action of disinfectants and germicides.
- (c) The proper method, after embalming, for further safely preparing bodies for transportation.
- (d) The meaning of "contagion," and "infection;" the dangers they beget, and the best methods of their restriction and arrest.
- (e) The signs of death, and the best methods of their determination.

And such other topics, general and special, as the Board may from time to time determine.

Seventy-five per cent of satisfactory answers in a scale of one hundred shall be required to entitle the applicant to a permit.

Third.—Upon satisfactory evidence of the competency of the applicant as an embalmer, he may be granted a permit to prepare corpses herein designated for transportation upon the payment of the sum of five dollars, to pay the expenses of such examination. Said permit shall be limited to the term of one year, and shall be signed by the President of the State Board of Health, and attested by the Secretary and seal of the Board.

Permits may be renewed upon the payment of one dollar within thirty days after the expiration of the term of a permit.

Fourth.—The failure of the holder of a permit to comply with the regulations of the State Board of Health shall be deemed sufficient cause for the revocation of his permit.

Fifth.—The Secretary of the Board shall keep a record in which shall be registered the name and residence of all persons to whom a permit is granted, and the number and date of the permit, which record shall be for the information of the profession, the public and for transportation companies.

He shall also keep a record of all money received, expenses incurred and paid under these regulations, and make report thereof at each quarterly meeting of the Board.

Sixth.—Bodies of those who have died from diphtheria (membranous group), scarlet fever (scarlatina, scarlet rash), glanders, anthrax, or leprosy, may be transported by common carriers upon the affidavit of a funeral director, undertaker or embalmer, made under oath, that he is the holder of a permit from the State Board of Health, giving the number of the permit, his name and residence, and certifying that the body has been prepared for shipment in accordance with the regulations of the State Board of Health, to-wit:

In the case of diphtheria.—The body shall be thoroughly injected with a proven disinfectant embalming fluid, and all orifices of the body, such as the nares, mouth, rectum, and vaginæ in the female subject, then plugged with absorbent cotton. The body shall then be washed in the disinfecting fluid and wrapped in absorbent cotton layers one inch thick, then bandaged and placed in an air-tight zinc or metallic case.

In case of scarlet fever.—All clothing must be removed from the body, and the whole arterial system and cavities, including the cerebro-spinal, injected with a disinfectant of the highest germicidal powers. The body must then be thoroughly washed with the disinfecting fluid; all orifices plugged with absorbent cotton, then covered with absorbent cotton one inch thick, then bandaged and placed in an air-tight zinc or metallic case.

In case of glanders, anthrax or leprosy.—After protecting the hands by either vaseline or gloves, all clothing which has been around the body shall be removed and burned. The body shall then be thoroughly washed with a disinfectant of the highest proven germicidal powers, and sufficient of the disinfectant and embalming fluid injected into the circulatory system to thoroughly saturate all the tissues of the body. All the main cavities of the body shall be filled with the disinfectant, and all orifices plugged with absorbent cotton. The body shall then be washed with the disinfectant, wrapped in absorbent cotton not less than one inch thick, then bandaged and placed in an air-tight zinc or metallic case. When the condition of the body demands the removal of the blood, it may be removed by using a

bottle which contains not less than four ounces of the disinfecting fluid. The vein selected for the operation must be opened carefully and the tube introduced to the right auricle of the heart, and the blood aspirated into the bottle without exposing it to the air of the room, or without coming in contact with the hands of the operator.

Seventh.—Disinfectants referred to herein must be approved by the State Board of Health.

Eighth.—The foregoing rules shall go into effect, and be in force on and after September 1, 1898.

CONTAGIOUS DISEASES AMONG DOMESTIC ANIMALS.

RULES AND REGULATIONS.

Pursuant to authority vested by chapter 14, title 12, of the code, section 2530, the State Veterinary Surgeon, by and with the approval of the State Board of Health, and the Executive Council, does hereby make and establish the following rules and regulations for the prevention and restriction of contagious diseases among domestic animals:

RULE 1. All cattle brought within this State from any county or parish within the United States where pleuro-pneumonia is known to exist, shall be subject to quarantine for a period of not less than sixty days.

RULE 2. No person owning or having the care or custody of any animal affected with glanders or farcy, or which there is reason to believe is affected with said disease, shall lead, drive, or permit such animal to go on or over any public grounds, unenclosed lands, street, road, public highway, lane, or alley; or permit it to drink at any public water trough, pail, or spring; nor keep such diseased animal in any enclosure, in or from which such diseased animal may come in contact with, or close proximity to, any animal not affected with such disease.

RULE 3. Whenever notice is given to the trustees of a township or to a local board of health, of animals suspected of being affected with glanders or farcy, said trustees shall immediately require such suspected animals to be isolated and kept separate and apart from all other animals until released by order of the State Veterinary Surgeon or some person acting by his authority.

RULE 4. An animal must be considered as "suspected" when it has stood in a stable with, or been in contact with an animal known to have the glanders; or if placed in a stable, yard or other enclosure where a glandered animal has been kept.

RULE 5. Whenever any animal affected with anthrax, glanders or farcy, shall die or shall be killed, the body of such animal shall be immediately burned, or shall have kerosene poured over it and buried not less than four feet deep without removal of the hide or any part of the carcass.

Reasons for Rule 5.—To prevent the possibility of a recurrence of these diseases from germs existing in the grave, which, if not destroyed by some powerful agent, will retain their vitality for a number of years so as to impart the disease.

As they are communicable by inoculation to human beings, great precaution should be used in handling animals affected with this disease.

RULE 6. No animal diseased with glanders or farcy shall be deemed to have any property value whatever, and no appraisal thereof will be made.

Reasons for Rule 6.—Glanders is an incurable disease, and there is no warrant for expending public money in appraising property manifestly worthless, and which can be compensated for only at "its actual value in its condition when condemned." Also to prevent the introduction of diseased animals into the State, and the inoculation of worthless ones for speculative purposes.

RULE 7. Whenever the owner or person having in charge any animal declared by the State Veterinary Surgeon or other authorized person to have the glanders, shall neglect or refuse to destroy said animal, the premises whereon such animal is kept shall be quarantined until such animal is destroyed and the premises thoroughly disinfected.

QUARANTINE.

RULE 8. The term "quarantine" shall be construed to mean the perfect isolation of all diseased or suspected animals from contact with healthy animals, as well as the exclusion of such healthy animals from the yards, stables, enclosures or grounds wherever said suspected or diseased animals are or have been kept.

RULE 9. So-called "piggy" or pregnant sows and rejected cattle found in railway or packing house stock yards must not be sold nor delivered to farmers, but held subject to such quarantine as may be deemed necessary to prevent the communication of any contagious disease.

RULE 10. All hogs presented for the Iowa State fair and Sioux City fair shall be subject to examination by the State Veterinary Surgeon before entering the fair grounds, and to daily inspection during the exhibition. Should any animal become diseased with hog cholera or swine plague, it must be immediately removed to a place of quarantine. The show-pens must be cleansed and disinfected under the supervision of the State Veterinary Surgeon before and during the fair.

RULE 11. In suspected cases of glanders and farcy, when the symptoms do not warrant the State Veterinarian in condemning the animal, the mallein test shall be recognized as a valuable diagnostic.

RULE 12. In suspected cases of bovine tuberculosis the tuberculin test shall be recognized as a valuable diagnostic.

DISINFECTION.

Among the most efficient and convenient agents for destroying disease germs, are heat, solutions of creolin, carbolic acid, sulphate of iron, caustic soda, or sulphate of copper, fumes of chlorine, chloride of lime, slaked lime, lime water, whitewash and kerosene oil.

Heat.—This is conveniently applied by means of boiling water or oil, and is especially recommended for disinfecting fabrics of all kinds, leather or wood. Articles of iron or other metals may be purified by heating in a fire. All bedding, litter, excrement, etc., that have accumulated about animals affected with any form of contagious disease, and the carcasses, together with all blood or other fluid elements that have escaped from such carcasses and contaminated soil should be burned, as surest means of eradicating the disease.

Dirt or earth floors of stables wherein animals affected with glanders or anthrax have been kept, should be removed to the depth of four inches and burned.

SOLUTIONS.

Creolin.—One to fifty or one hundred parts.

Carbolic acid.—Add one part of the acid to five or ten parts of water or oil.

Sulphate of iron, copper and caustic soda.—Add as much of the substance to a given quantity of warm water as will be dissolved.

Whitewash.—For disinfecting interior walls of buildings, feed-boxes, mangers, yards, fences, etc., the application of a coating of whitewash prepared from lime in the ordinary way, so thoroughly done as to completely cover every part of the surface designed to be cleansed, is an economical method.

FUMIGANTS.

Chloride of lime.—Chloride of lime and slaked lime for disinfecting floors, yards, carcasses and ground where dead or diseased animals have lain, in fine powder, should be scattered over the surface of objects to be disinfected thickly, so as to form a complete covering.

Chlorine.—To generate, take peroxide of manganese (to be obtained at any drug store), place in an earthen dish and add one pound of hydrochloric acid (sometimes called muriatic acid), to each four ounces of the peroxide manganese. Care should be taken not to inhale the gas.

After the floors, walls, etc., of a contaminated building have been cleansed, they should be fumigated by some of the foregoing agents. The doors should be closed, and the building otherwise made as tight as possible. Fumes should then be evolved in the building for not less than half a day, and the doors kept closed not less than twenty-four hours, when air and sunlight should be freely admitted.

BURIALS.

Kerosene oil.—Carcasses buried in the earth, where there is danger of infection by exhumation by other animals should, previous to burial, be thoroughly covered with quick lime, or saturated with kerosene oil. This will tend to destroy the virus, and will prevent carnivorous animals disturbing the carcass and thereby spreading the disease.

Freezing.—It has been demonstrated repeatedly in Iowa, that the frosts of winter thoroughly disinfect pasture lands that have been poisoned with the virus of Texas fever by herds of southern cattle during the summer months. From the first of April to the first of November, the virus is likely to retain its vitality, and the strictest precaution is necessary to prevent communication of the disease to northern cattle. The purifying effect of frost, however, cannot be relied upon for destroying the virus of any other disease than Texas fever, liable to attack live stock in Iowa.

It is for the interest of every community, on the appearance of contagious or infectious disease among animals, to adopt speedy measures to eradicate the same, and to co-operate with the State Veterinary Surgeon in securing such result in the shortest possible time.

THE STATUTES.

CHAPTER 14, TITLE 12, CODE.

OF THE STATE VETERINARY SURGEON.

SECTION 2529. The State Veterinary Surgeon shall be appointed by the Governor, subject to removal by him for cause, who shall hold office for three years. He shall be a graduate of some regularly established veterinary college, skilled in that science, and shall be by virtue of his office a member of the State Board of Health.

SEC. 2530. He shall have supervision of all contagions and infectious diseases among domestic animals in, or being driven or transported through, the State, and is empowered to establish quarantine against animals thus diseased, or that have been exposed to others thus diseased, whether within or without the State, and, with the concurrence of the State Board of Health, may make such rules and regulations as he may regard necessary for the prevention and suppression, and against the spread, of said disease or diseases, which rules and regulations, the Executive Council concurring, shall be published and enforced, and in the performance of his duties he may call for the assistance of any peace officer.

SEC. 2531. Any person who wilfully hinders, obstructs or resists said Veterinary Surgeon, his assistants, or any peace officer acting under him or them, when engaged in the duties or exercising the powers herein conferred, or violates any quarantine established by him or them, shall be guilty of a misdemeanor.

SEC. 2532. Said Surgeon shall biennially make a full and detailed report of his doings since his last report to the Governor, including his compensation and expenses, which report shall not exceed 150 pages of printed matter.

SEC. 2533. Whenever a majority of any board of supervisors or township trustees, or any city or town council, whether in session or not, shall in writing notify the Governor of the prevalence of, or probable danger from, any of said diseases, he shall notify the Veterinary Surgeon, who shall at once repair to the place designated in said notice and take such action as the exigencies may demand, and the Governor may, in case of emergency, appoint a substitute or assistants with like qualifications, and with equal powers and compensation.

SEC. 2534. Whenever in the opinion of the State Veterinary Surgeon the public safety demands the destruction of any stock, the same may be destroyed upon the written order of such surgeon, with the consent of the owner, or upon approval of the Governor, and by virtue of such order such

surgeon, his deputy or assistant, or any peace officer, may destroy such diseased stock, and the owner thereof shall be entitled to receive its actual value in its condition when condemned, to be ascertained and fixed by the State Veterinary Surgeon and the nearest justice of the peace, who, if unable to agree shall call upon the nearest or other justice of the peace upon whom they agree, as umpire, and their judgment shall be final when the value of the stock, if not diseased, would not exceed \$25; but in all other cases either party shall have the right of appeal to the district court, but such appeal shall not delay the destruction of the diseased animals. The Veterinary Surgeon shall at once file with the Governor his written report thereof, who shall, if found correct, endorse his finding thereon, whereupon the Auditor of State shall issue his warrant therefor upon the Treasurer of State, who shall pay the same out of any moneys at his disposal under the provisions of this act, but no compensation shall be allowed for stock destroyed while in transit through or across the State, and the word "stock," as herein used, shall be held to mean cattle, horses, mules and asses.

SEC. 2535. The Governor, with the Veterinary Surgeon, may co-operate with the Government of the United States for the objects of this chapter, and the Governor may accept and receipt for any moneys receivable by the State under the provisions of any act of congress which may at any time be in force upon this subject and pay the same into the State treasury to be used according to the act of congress and the provisions of this chapter as nearly as may be.

SEC. 2536. There is annually appropriated out of any moneys, not otherwise appropriated, the sum of \$3,000 or so much thereof as may be necessary, for the uses and purposes herein set forth.

SEC. 2537. Any person, except the Veterinary Surgeon, called upon under the provisions of this chapter, shall be allowed and receive \$2 per day while actually employed.

SEC. 2538. When engaged in the discharge of his duties, the Veterinary Surgeon shall receive the sum of \$5 per day and his actual expenses, the claim therefor to be itemized, verified, accompanied with written vouchers, and filed with the State Auditor, who shall allow the same and draw his warrant upon the treasury therefor.

CHAPTER 11, TITLE 24, CODE.

DISEASED ANIMALS.

SEC. 5012. If the owner of sheep, or any person having the same in charge, knowingly import or drive into this State sheep having any contagious disease; or knowingly turn out or suffer any sheep having any contagious disease to run at large upon any common road, or unenclosed lands; or sell or dispose of any sheep, knowing the same to be so diseased, he shall be fined in any sum not less than fifty nor more than one hundred dollars.

SEC. 5013. If any person knowingly import or bring within the State any horse, mule or ass, affected by the diseases known as nasal gleet, glanders or button-farcy, or suffer the same to run at large upon any common,

road, or unenclosed land, or use or tie the same in any public place, or off his own premises, or sell, trade or offer for sale or trade any such animal, knowing the same to be so diseased, he shall be fined not less than fifty nor more than five hundred dollars, or be imprisoned not to exceed one year in the county jail, or both.

SEC. 5014. If any horse, mule or ass reasonably supposed to be diseased with nasal gleet, glanders, or button-farcy be found running at large without any known owner, it shall be lawful for the finder thereof to take such animal, so found, before some justice of the peace, who shall forthwith cause the same to be examined by some veterinary surgeon, or other person skilled in such diseases, and if, on examination, it is ascertained to be so diseased, it shall be lawful for such justice of the peace to order such diseased animal to be immediately destroyed and buried; and the necessary expense accruing under the provisions of this section shall be defrayed out of the county treasury.

SEC. 5015. The owner or person having charge of any swine any of which die or are killed on account of any disease, shall upon such fact coming to his knowledge, immediately burn the same.

SEC. 5016. No person shall sell or give away or offer for sale any swine that have died of any disease, or that have been killed on account of any disease.

SEC. 5017. No person shall convey upon or along any public highway or other public ground, or any private land except that owned or leased by him, any diseased swine, or swine that have died of or have been killed on account of any disease. Upon the trial for the violations of the provisions of this section, the proof that any person has hauled or is hauling dead swine from a neighborhood in which swine have been dying, or are at the time dying, from any disease, shall be presumptive evidence of his guilt.

SEC. 5018. It shall be unlawful for any person negligently or wilfully to allow his hogs or those under his control, infested with any disease, to escape his control or run at large.

SEC. 5019. Any person violating or failing to comply with any provision of the four preceding sections shall be fined not less than \$5 nor more than \$100, or be imprisoned in the county jail not to exceed thirty days, or both.

SEC. 5020. Any person driving any cattle into this State, or any agent, servant or employe of any railroad or other corporation who shall carry, transport or ship any cattle into this State, or any railroad company or other corporation or person who shall carry, ship or deliver any cattle into this State, or the owner, controller, lessee or agent or employe of any stock yard, receiving into such stock yard, or in any other enclosure, for the detention of cattle in transit or shipment, or reshipment, or sale any cattle brought or shipped in any manner into this State, which at the time they were either driven, brought, shipped or transported into this State, were in such condition as to infect with or to communicate to other cattle pleuro-pneumonia, or splenetic or Texas fever, shall be fined not less than \$300 and not more than \$1,000, or be imprisoned in the county jail not exceeding six months, or both.

SEC. 5021. Any person who shall be injured or damaged by any acts prohibited in the preceding section, in addition to the remedy therein provided, may recover the actual damages sustained by him from the person, agent, employe or corporation therein mentioned, and neither said criminal proceeding nor said civil action shall be a bar to a conviction or to a recovery in the other.

SEC. 2343. The board of supervisors of any county, when notified in writing by five or more sheep owners of such county that sheep diseased with scab, or any other malignant, contagious disease, exist in such county, shall, at any regular or special meeting, appoint a suitable person as county sheep inspector, who shall take the oath of office, whose duties shall be as hereinafter prescribed, and whose term of office shall be for two years and until his successor is appointed and qualified.

SEC. 2344. It shall be the duty of the sheep inspector, upon the complaint of three or more sheep owners that any sheep within his jurisdiction have the scab or any other malignant, contagious disease, to immediately inspect and report in writing the result of his inspection to the county auditor, to be filed by him for reference by the board of supervisors or any party concerned. And if he deem it necessary, in order to prevent the spread of the disease to the sheep of the other owners, he shall command the owner or agent to dip or otherwise treat such diseased sheep, and shall inspect such diseased sheep every month thereafter until such disease shall be eradicated.

SEC. 2345. It shall be the duty of the sheep inspector to dip or otherwise treat such diseased sheep, should the owner or agent refuse to do so, and all costs, expenses and charges, together with a per diem of \$3 per day, shall be charged against the owner of such sheep, and shall be a lien thereon, and may be recovered in an action.

SEC. 2346. Such compensation for the inspector shall be three dollars per day, and shall be paid by the owner of the sheep, or his agent, if the disease is found to exist. In case no disease is found to exist the complainants shall pay such fee.

SEC. 2347. Upon the arrival of any flock of sheep within the state from a distance of more than twenty miles outside the boundaries of the state, the owner or agent shall notify the inspector of the county in which such sheep are being held, and he shall inspect the flock at the expense of the owner or agent; and if the sheep are found sound shall furnish the owner or agent a certificate, which shall be a passport to any part of the state; but sheep in transport on board of railroad cars, or passing through the state on such cars, shall not come within the provisions of this section. Any violation of, or failure to comply, with the provisions of this and the four preceding sections by the owner of any sheep shall subject him to a forfeiture of not to exceed one hundred dollars, which shall be a lien on such sheep, and shall be recovered in an action by the county attorney in the name and for the use of the county.

SEC. 4979. If any person throw, or cause to be thrown, any dead animal into any river, well, spring, cistern, reservoir, stream or pond, he shall be imprisoned in the county jail not less than ten nor more than thirty days, or be fined not less than five nor more than one hundred dollars.

SEC. 4981. If any person knowingly sell any kind of diseased, corrupted or unwholesome provisions, whether for meat or drink, without making the nature and condition of same fully known to the buyer, he shall be imprisoned in the county jail not more than thirty days, or be fined not exceeding one hundred dollars.

The flesh of pregnant animals must not be sold nor used for human food after the seventh month of pregnancy for cows, and the tenth week for sows.—*Regulations of the State Board of Health.*

APPENDIX.

Laws Relating to the Public Health and Safety.

Compiled from the Code, and from the Acts of the
Twenty-seventh General Assembly.

XXXIV.

STATE BOARD OF HEALTH.

CHAPTER 16, TITLE XII.

SECTION 2584. The State Board of Health shall consist of the Attorney-General and the State Veterinary Surgeon, who shall be members by virtue of their offices, one civil engineer and seven physicians, to be appointed by the Governor, each to serve for a term of seven years and until his successor is appointed; vacancies to be filled by the Governor for the unexpired term. But no one of the seven physicians hereafter appointed shall be an officer or member of the faculty of any medical school, and the Governor shall have the power to remove any member of said Board for good cause shown. It shall meet semi-annually in May and November, and at such other times as it may decide upon, such meetings to be held at the seat of government; suitable rooms [office supplies and furniture, except postage and stationery*] therefor to be provided by the custodian of the capitol. At the meeting held in May, a president from their number, and a secretary who shall be a physician not of their number, shall be elected, and the latter have an office in the capitol.

SEC. 2585. The Board shall have charge of and general supervision over the interests of the health and life of the citizens of the State; matters pertaining to quarantine, registration of marriages, births and deaths; authority to make such rules and regulations and sanitary investigations as it from time to time may find necessary for the preservation and improvement of the public health, which, when made, shall be enforced by local boards of health and peace officers of the State. It shall prepare and furnish, through its secretary, to the clerks of the several counties such forms for the record of marriages, births and deaths as it may determine upon, and by its secretary make biennial reports to the Governor, which shall include so much of its proceedings, such information concerning vital statistics, such knowledge respecting diseases, and such instruction upon the subject of hygiene, as may be thought useful for dissemination among the people, with such suggestions as to further legislation as may be thought advisable.

* As amended by the Twenty-seventh General Assembly, Chapter 67.

SEC. 2566. It shall be the duty of all assessors, at the time of making assessments, to obtain and report to the clerk of the district court, upon blanks adopted by the State Board of Health and furnished by the county auditor, such registration of births and deaths as occur within their respective districts for the year ending December 31st immediately preceding.

SEC. 2567. The clerk of the court in each county shall keep a book in which shall be recorded all marriages occurring within the county, together with such data respecting the same as shall be required by the State Board of Health, and shall report to the secretary of the State Board of Health on or before the first day of June in each year such data respecting such marriages for the year ending December 31st immediately preceding. The clerk of the district court of each county shall keep a book in which shall be recorded all births and deaths occurring within the county as shown by the returns filed in his office by the assessor, as provided in section 2566; and on or before the first day of June in each year shall furnish to the secretary of the State Board of Health a report of such births and deaths.

SEC. 2568. The mayor and council of each town or city, or the trustees of any township, shall constitute a local board of health within the limits of such towns, cities or townships of which they are officers. The town, city or township clerk shall be clerk of the local board, which board shall appoint a competent physician as its health officer, who shall hold office during its pleasure. It shall regulate all fees and charges of persons employed by it in the execution of health laws and its own regulations and those of the State Board of Health; have charge of all cemeteries dedicated to public use not controlled by other trustees or incorporated bodies, and the burial of the dead; make such regulations as are necessary for the protection of the public health respecting nuisances, sources of filth, causes of sickness, rabid animals and quarantine, not in conflict with any regulations of the State Board of Health, which shall also apply to boats or vessels in harbors or ports within their jurisdiction; to proclaim and establish quarantine against all infectious or contagious diseases dangerous to the public, and maintain and remove the same, as may be required by regulations of the State Board; may, when satisfied upon due examination that any cellar, room, tenement building, or place occupied as a dwelling or otherwise has become, or is by reason of the number of occupants, uncleanness or other cause, unfit for such purpose, or a cause of nuisance or sickness to the occupants or the public, issue a notice in writing to such occupants or any of them, requiring the premises to be put in proper condition as to cleanliness, or requiring the occupants to remove or quit such premises within a reasonable time to be fixed; and, if the persons so notified or either of them neglect or refuse to comply therewith, may by order cause the premises to be properly cleaned at the expense of the owner or owners, or may forcibly remove the occupants and close the premises, and peace and police officers shall execute such orders, which premises so closed shall not be again occupied as a dwelling place without written permission of the board. The quarantine authorized by this section in case of infectious or contagious diseases may be declared or terminated by the mayor of any city or town, or the township clerk outside of such city or

town, in cases required by regulations of the State Board of Health, upon written notice given by any practicing physician of the existence of such disease, or termination of the cause for quarantine, as the case may be.

SEC. 2569. The local board may with its physician, when of the opinion it is necessary for the preservation of the lives or health of the inhabitants, enter a building, vessel or place for the purpose of examining into, preventing, removing or destroying any nuisance, source of filth or cause of sickness, and, in case its members or physician shall be refused such entry, make complaint through any member under oath to any magistrate of the county, whether a member of the board or not, stating the facts so far as known, and the magistrate shall thereupon issue his warrant, directed to any peace officer of the county, commanding him between the hours of sunrise and sunset, accompanied by two or more members of the board, to prevent, remove or destroy such nuisance, source of filth or cause of sickness, which shall be executed by the officer under the direction of such members of the board, and it may order the owner of any property, building or place to remove at his own expense, within twenty-four hours, or such other time as may be fixed by it, after notice has been served upon such owner, occupant or other person in charge thereof, any nuisance, source of filth or cause of sickness found thereon, and if such person fails or neglects to comply with the order and make such removal, it may cause the same to be done at the expense of the owner or occupant.

SEC. 2570. When any person shall be infected, or shall have been recently infected, or sick with smallpox or other disease dangerous to the public health, whether a resident or otherwise, it may make such provisions as are best calculated to preserve the inhabitants against danger therefrom, by removing such person to a separate house, when it may be done without injury to his health, and provide nurses, needful assistance and supplies, which shall be charged to the person, or those liable for his support, if able; if unable, it shall be done at the expense of the county. If such person cannot be removed, he shall be cared for in the same manner as in cases of removal with like results as to charges therefor, and in addition it may cause the people in the neighborhood to remove from the vicinity of the infected house, and take any and all other needed action to insure the safety of the citizens. The removal or care of infected persons, as herein provided, shall be effected by an application made to a civil magistrate in the manner provided for the removal and abatement of nuisances, who shall issue his warrant, as directed in such cases, requiring the officer to remove such person, or take possession of condemned houses or lodgings, and provide nurses, attendants and other necessities for the care, safety and relief of the sick, which warrant shall be executed under the direction of the board of health.

SEC. 2571. Local boards of health shall meet for the transaction of business on the first Mondays of April and October in each year, and at such other times as may seem necessary. They shall give notice of all regulations adopted, by publication thereof in some newspaper printed and circulated in the town, city or township, or, if there is none, by posting a copy thereof in five public places therein, and through their physician or clerk shall make general report to the State Board at least once a year, and special reports when it may demand them, of its proceedings and such

other facts as may be required, on blanks furnished by and in accordance with instructions from it. All expenses incurred in the enforcement of the provisions of this chapter, when not otherwise provided, shall be paid by the town, city or township; in either case all claims to be presented and audited as other demands. In the case of townships, the trustees shall certify the amount required to pay such expenses to the board of supervisors of the county, and it shall advance the same, and, at the time it levies the general taxes, shall levy on the property of such township a sufficient tax to reimburse the county, which, when collected, shall be paid to and belong to the county.

SEC. 2572. Local boards of health shall obey and enforce the rules and regulations of the State Board; and peace and police officers within their respective jurisdictions, when called upon to do so by the local boards, shall execute the orders of said board.

SEC. 2573. Any person being notified to remove any nuisance, source of filth or cause of sickness, as in this chapter provided, who fails, neglects or refuses to do so after the time fixed in such notice, or knowingly fails, neglects or refuses to comply with and obey any order, rule or regulation of the State or local board of health, or any provision of this chapter, after notice thereof has been given as herein provided, shall forfeit and pay the sum of \$20 for each day he refuses such obedience, or for each day he knowingly fails, neglects or refuses to obey such rule or regulation, or knowingly violates any provision of this chapter, to be recovered in an action in the name of the clerk of the board, and, when collected, to be paid to the clerk of the town, city or township, as the case may be, and for its benefit; and, in addition thereto, anyone so offending, or knowingly exposing another to infection from any contagious disease, or knowingly subjecting another to the danger of contracting such disease from a child or other irresponsible person, shall be liable for all damages resulting therefrom, and guilty of a misdemeanor.

SEC. 2574. The secretary of the State Board of Health shall receive such salary as the Board shall fix, not to exceed \$1,200 yearly, payable upon the certificate of the President to the State Auditor, who shall issue his warrant for the amount due upon the State Treasurer. Each member of the Board shall receive only actual traveling and other necessary expenses incurred in the performance of his duties, such expenses to be itemized, verified, certified, audited, and a warrant drawn therefor in the same manner as the secretary's salary.

SEC. 2575. The sum of \$5,000 or so much thereof as may be necessary, is annually appropriated to pay the salary of the Secretary, expenses of the Board, contingent expenses of the secretary's office, and all costs of printing; all such contingent and miscellaneous expenses to be itemized, verified, certified, audited and paid as other expenses of the Board.

CHAPTER 17, TITLE XII.

OF THE PRACTICE OF MEDICINE.

SECTION 2576. *Board of medical examiners—examinations—certificates.*—The State Board of Medical Examiners shall consist of the physicians of the State Board of Health, and the Secretary of the Board of Health shall be Secretary thereof. It shall hold regular meetings in May and November and special ones as may be necessary, due notice thereof being given, at which it shall discharge the duties contemplated by this chapter. All examinations shall be in writing, each candidate for examination in any school of medicine being given the same set of questions, covering anatomy, physiology, general chemistry, pathology, surgery and obstetrics. In materia medica, therapeutics, and the principles and practice of medicine, a set of questions shall be used corresponding to the school of medicine which the applicant desires to practice. The examination papers, when concluded, shall be marked upon the scale of 100, each candidate for examination first to pay to the Secretary of the Board a fee of \$20 therefor. The average required to pass shall be fixed by the Board prior to the examination. Each applicant shall, upon obtaining an order for examination, receive from the Secretary a confidential number which he shall place upon his work when completed, so that the Board, in passing thereon, shall not know by whom it was prepared. All matters connected therewith shall be filed with the Secretary and preserved for five years as a part of the records of the Board, during which time they shall be open to public inspection. If the examination is satisfactory to five members of the Board, it shall issue its certificate, under its seal, signed by its President, Secretary, and not less than three other members, who may, in the absence of the others, act as an examining board, and the different schools of medicine represented in the Board of Health shall be represented in said number. The certificate, while in force, confer upon the holder the right to practice medicine, surgery and obstetrics, and be conclusive evidence thereof. Graduates from legally authorized medical schools, which in the opinion of the Board are of good standing, holding genuine diplomas therefrom, upon presentation of the same, accompanied by a fee of \$5, and such proof as may be required touching the genuineness and ownership of the diploma and the character and standing of the school issuing it, shall be by the Board granted certificates, signed as above provided, conferring the right to practice as under certificates issued upon examination. In all examinations made or proceedings had pursuant to the provisions of this chapter, any member of the Board may administer oaths and take testimony in any manner authorized by law. Any one failing in his examination shall be entitled to a second one, within three months thereafter, without further fee. If any person shall, by notice in writing, apply to the Secretary of the Board for an examination or a re-examination, and it fails or neglects for three months thereafter to give him the same, he may, notwithstanding any provision of this chapter, practice medicine until the next regular meeting of the Board without the required certificate.

SEC. 2577. *Recording certificates.*—Every certificate issued under this chapter shall show whether it was granted upon examination or diploma, and the school of medicine the holder practices under. He shall, before engaging in the practice of medicine, file the same for record in the office of the recorder of the county in which he resides, who shall record it in a book provided for that purpose, which record shall be open to public inspection, and for which service the recorder may charge a fee of 50 cents, to be paid by the certificate-holder. The same record must be made of the certificate in any county to which the holder may remove and in which he proposes to practice.

SEC. 2578. *Refusal of certificate—revocation.*—The Board of Medical Examiners may refuse to grant a certificate to any person otherwise qualified, who is not of good moral character, and for like cause, or for incompetency, or habitual intoxication, or upon satisfactory evidence by affidavit or otherwise that a certificate had been granted upon false or fraudulent statements as to graduation or length of practice, may revoke a certificate by an affirmative vote of at least five members of the Board, which number shall include one or more members of the different schools of medicine represented in said Board; nor shall the standing of a legally chartered medical college, from which a diploma may be presented, be questioned, save by a like vote. After the revocation of a certificate, the holder thereof shall not practice medicine, surgery or obstetrics in the State.

SEC. 2579. *Who deemed practitioner.*—Any person shall be held as practicing medicine, surgery or obstetrics, or to be a physician, within the meaning of this chapter, who shall publicly profess to be a physician, surgeon or obstetrician, and assume the duties, or who shall make a practice of prescribing or of prescribing and furnishing medicine for the sick, or who shall publicly profess to cure or heal; but it shall not be construed to prohibit students of medicine, surgery or obstetrics, who have had not less than two courses of lectures in a medical school of good standing, from prescribing under the supervision of preceptors, or gratuitous service in case of emergency, nor to prevent the advertising, selling or prescribing natural mineral waters flowing from wells or springs, nor shall it apply to surgeons of the United States army or navy, nor of the marine hospital service, nor to physicians or midwives who have obtained from the Board of Examiners a certificate permitting them to practice medicine, surgery or obstetrics without a diploma from a medical school or examination by the Board, nor to physicians, as defined herein, who have been in practice in this State for five consecutive years, three years of which time shall have been in one locality, nor to filling prescriptions by a registered pharmacist, nor to the advertising and sale of patent or proprietary medicines.

SEC. 2580. *Penalties.*—Any person who shall present to the Board of Medical Examiners a fraudulent or false diploma, or one of which he is not the rightful owner, for the purpose of procuring a certificate as herein provided, or shall file, or attempt to file, with the recorder of any county in the State the certificate of another as his own, or who shall falsely personate any one to whom a certificate has been granted by such Board, or shall practice medicine, surgery or obstetrics in the State without having first obtained and filed for record the certificate herein required, and who is not embraced in any of the exceptions contained in this chapter, or who contin-

ues to practice medicine, surgery or obstetrics after the revocation of his certificate, is guilty of a misdemeanor, and, upon conviction thereof, shall be fined not less than \$300, nor more than \$500 and costs of prosecution, and shall stand committed to the county jail until such fine is paid; and whoever shall file or attempt to file with the recorder of any county in the State the certificate of another with the name of the party to whom it was granted or issued erased, and the claimant's name inserted, or shall file or attempt to file with the Board of Medical Examiners any false or forged affidavit of identification, shall be guilty of forgery.

SEC. 2581. *Itinerant physician.*—Every physician practicing medicine, surgery or obstetrics, or professing or attempting to treat, cure or heal diseases, ailments or injuries by any medicine, appliance or method, who goes from place to place, or from house to house, or by circulars, letters or advertisements solicits persons to meet him for professional treatment at places other than his office at the place of his residence, shall be considered an itinerant physician; and any such itinerant physician shall, in addition to the certificate elsewhere provided for in this chapter, procure from the State Board of Medical Examiners a license as an itinerant, for which he shall pay to the Treasurer of State, for the use of the State of Iowa, the sum of \$250 per annum. Upon payment of this sum, the Secretary shall issue to the applicant therefor a license to practice within the State, as an itinerant physician, for one year from the date thereof. The Board may, for satisfactory reasons, refuse to issue such license, or may cancel such license upon satisfactory evidence of incompetency or gross immorality. Any person practicing medicine as an itinerant physician, as herein defined, without having procured such license shall be guilty of a misdemeanor, and, upon conviction thereof, shall be fined not less than \$300, nor more than \$500, and costs, and shall be committed to the county jail until such fine is paid; *provided*, however, that nothing herein shall be construed to prevent any physician otherwise legally qualified from attending patients in any part of the State to whom he may be called in the regular course of business, or in consultation with other physicians.

SEC. 2582. *Examination and diploma required.*—From and after January 1, 1899, all persons beginning the practice of medicine in the State of Iowa must submit to an examination as set forth in this chapter, and, in addition thereto, shall present diplomas from medical colleges recognized as in good standing by the State Board of Medical Examiners, and all persons receiving their diplomas subsequent to January 1, 1899, shall present evidence of having attended four full courses of study of not less than twenty-six weeks each, no two of which shall have been given in any one year.

SEC. 2583. *Fees—compensation.*—Each member of the Board of Examiners shall receive, out of the fund created by the payment of fees by applicants for examination or certificates, the sum of eight dollars for each day, and necessary traveling expenses, for the time he is actually engaged in the discharge of his duties as a member of the Board, and the Secretary shall receive his necessary expenses incurred for services which cannot be performed at the capitol. (All printing, postage, and other contingent expenses necessarily incurred under the provisions of this chapter shall be paid from said fund.)* Any balance of said funds remaining shall be turned over to the State Treasurer for the use of the school fund.

*As amended by the Twenty-seventh General Assembly, Chapter 68.

CHAPTER 69, LAWS TWENTY-SEVENTH GENERAL ASSEMBLY.

OF THE PRACTICE OF OSTEOPATHY.

SECTION 1. Any person holding a diploma from a legally incorporated and regularly conducted school of osteopathy of good repute as such, and wherein the course of study comprises a term of at least twenty months or four terms of five months each, in actual attendance at such school, and shall include instructions in the following branches, to-wit: Anatomy, physiology, chemistry, histology, pathology, gynecology, obstetrics and theory and practice of osteopathy, shall, upon the presentation of such diploma to the State Board of Medical Examiners and satisfying such Board that they are legal holders thereof, shall be granted by such board a certificate permitting such person to practice osteopathy in the State of Iowa, upon payment to said Board of a fee of twenty dollars, which certificate shall be recorded by the county clerk of the county in which the holder desires to practice for which he shall receive a fee of one dollar.

SEC. 2. The certificate provided for in the foregoing section, shall not authorize the holder thereof to prescribe or use drugs in his practice, nor to perform major or operative surgery.

SEC. 3. Any person who for the purpose of securing such certificate shall falsely represent himself or herself to be the legal holder of any such diploma, shall be deemed guilty of a misdemeanor, and on conviction be fined not less than fifty nor more than one hundred dollars.

SEC. 4. Any such certificate may be revoked by the State Board of Health upon satisfactory proof of fraudulent misrepresentation in securing the same or for any violation of the provisions of the certificate and for any gross immorality by the holder thereof.

SEC. 5. The system, method or science of treating diseases of the human body commonly known as osteopathy is hereby declared not to be the practice of medicine, surgery or obstetrics within the meaning of section twenty-five hundred and seventy-nine (2579), title twelve (12), chapter seventeen (17) of the code.

CHAPTER 18, TITLE 12.

OF PRACTICE OF PHARMACY.

SECTION 2584. *Commissioners—powers.*—The commission of pharmacy shall consist of three competent pharmacists who have been for the preceding five years residents of the State and engaged in practicing pharmacy, one of whom shall be annually appointed by the governor and hold office for three years and until his successor is appointed and qualified. The commission shall have power to make all needed regulations for its government and for the proper discharge of its duties under this chapter, the same to be done without expense to the State, save the necessary blanks and stationery which shall, upon requisition, be furnished by the Secretary of State, and make such other regulations not inconsistent with law and as authorized in this code, respecting the purchase, keeping and use of intoxicating liquors by

registered pharmacists, not permit holders, as may be required for the prevention or abuse of the trust reposed in them, and such other matters as may be hereinafter specifically enumerated.

SEC. 2585. *Secretary and treasurer.*—The commissioners of pharmacy shall annually, on the first Monday in May, elect a suitable person, who shall not be a member of said board, and who shall be known as secretary and treasurer; said secretary and treasurer shall enter upon the discharge of his duties as soon as he shall have filed with the Secretary of State a good and sufficient bond in the penal sum of \$3,000, signed by at least two sureties, who shall justify in the aggregate to double the amount of said bond, and which shall bear upon its face the approval of the governor. The salary of said secretary and treasurer shall not exceed \$1,500 per annum.

SEC. 2586. *License fees.*—The secretary and treasurer shall keep in his office a book known as the "commissioners of pharmacy license fee book," which shall be made with ruled columns and printed headings, showing the date, the name of the person paying and the amount of each license and fee paid, in which he shall enter all fees for licenses received by him, and on the first Monday of each month he shall file with the Auditor of State a true statement thereof for the previous month, properly sworn to by him, and shall quarterly pay into the State treasury, on the first day of January, April, July and October of each year, the amount of license fees payable by law into such treasury.

SEC. 2587. *Records—compensation.*—The books, accounts, vouchers and funds belonging to or kept by said board of pharmacy shall at all times be open or subject to the inspection of the governor, or any committee appointed by him. Each commissioner of pharmacy shall receive as full compensation for his services the sum of five dollars for each day actually employed in the discharge of his official duties, together with his actual traveling expenses in performing said duties, all of which shall be paid from the fees of the office, and each commissioner shall file with the Auditor of State, at the end of each quarter of his official year, an itemized statement under oath of his actual time in days employed in the discharge of his duty and traveling expenses incurred in the performance of his duty, for such quarter.

SEC. 2588. *Registered pharmacists.*—No person not a registered pharmacist shall conduct the business of selling at retail, compounding or dispensing drugs, medicines or poisons, or chemicals for medicinal use, or compounding or dispensing physicians' prescriptions as a pharmacist, nor allow anyone who is not a registered pharmacist to so sell, compound or dispense such drugs, medicines, poisons or chemicals, or physicians' prescriptions, except such as are assistants to and under the supervision of one who is a registered pharmacist, and physicians who dispense their own prescriptions only; but no one shall be prohibited by anything contained in this chapter from keeping and selling proprietary medicines and such other domestic remedies as do not contain intoxicating liquors or poisons, nor from selling concentrated lye or potash having written or printed on the package or parcel its true name and the word "poison," sales of which need not be registered. Whoever violates either provision of this section, for the former shall pay five dollars for each day of its violation, to be recovered in an action in the name of the State, brought by the county attorney under

the direction of the commission, and for the latter shall be guilty of a misdemeanor, and punished accordingly. In actions or prosecutions under this chapter, it need not be proven that the defendant has not a pharmacist's certificate, but such fact shall be a matter of defense.

SEC 2589. *Examinations—registration.*—The commission, at such times and places as it may select and in such manner as it may determine upon, shall examine all persons desiring to engage in and conduct business as registered pharmacists as contemplated in the preceding section, and, if found competent, the applicant's name shall be entered in the registry book of certificate holders. Graduates of pharmacy holding a diploma from the university, or an incorporated school or college which requires a practical experience in pharmacy of not less than four years before granting such diploma, may be registered without examination. Pharmacists thus registered have the sole right to keep and sell all medicines and poisons except intoxicating liquors.

SEC. 2590. *Registration and examination fees.*—Each person furnished a certificate and registered without examination shall pay to the commission two dollars, and each and every person whom they examine orally, or whose answers to a schedule of questions are returned subscribed to under oath, the sum of five dollars, which shall be in full for all services. And in case the examination of said person shall prove defective and unsatisfactory, and his name not be registered, he shall be permitted to present himself for re-examination within any period not exceeding twelve months next thereafter, and no charge shall be made for re-examination. The said commissioners are authorized to administer oaths pertaining to their said office and take and certify the acknowledgments of instruments in writing. After registration, an annual fee of one dollar for a renewal certificate shall be paid on or before the twenty-second day of March by all pharmacists who continue in business, and the conduct of such business without such renewal shall be a misdemeanor.

SEC. 2591. *Registry book—certificate displayed.*—The commission shall keep a registry book in which shall be recorded the names and places of residence of all certificate holders, with the date of such certificate, which shall hold good for one year, and no longer without renewal. Renewals shall be granted upon the payment of the annual fee fixed in the preceding section. Should a certificate holder change his residence, upon notice thereof such change shall be noted in the registry book. Each certificate holder shall keep displayed in his place of business his registration certificate. A failure to comply with this requirement shall be a misdemeanor.

SEC. 2592. *Sale of adulterated drugs.*—Registered pharmacists shall be responsible for the quality of all drugs, chemicals and medicines which they may sell or dispense, except those sold in the original packages of the manufacturer, and those known as patent medicines. If any such pharmacist shall knowingly adulterate or cause to be adulterated any drugs, chemicals or medical preparations by him kept for sale or sold, he shall be guilty of a misdemeanor.

SEC. 2593. *Sale of poisons.*—No person shall sell at retail any poisons enumerated in schedules A and B, except in dispensing poisons in usual quantities or doses upon the prescription of a physician as follows: Schedule A. arsenic and its preparations, corrosive sublimate, white precipitate, red

precipitate, biniodide of mercury, cyanide of potassium, hydrocyanic acid, strychnia and other poisonous vegetable alkaloids and their salts, essential oil of bitter almonds, opium and its preparations except paregoric and other preparations of opium containing less than two grains to the ounce; Schedule B. aconite, belladonna, colchicum, conium, nux vomica, henbane, savin, ergot, cotton root, cantharides, creosote, digitalis, and the pharmaceutical preparations, croton oil, chloroform, chloral hydrate, sulphate of zinc, mineral acids, carbolic acid and oxalic acid; unless the package containing such poisons has placed thereon, and also on the outside wrapper or cover, the name of the article, the word "poison," and the name and place of business of the seller; nor sell or deliver such poison unless, upon due inquiry it be found that the party receiving it is aware of its character and represents it is to be used for proper purposes; nor sell or deliver any of the poisons included in schedule A without also, before delivery of the same, causing an entry to be made in a book kept for that purpose of the date of sale, the name and address of the purchaser, the name of the poison, the purpose for which it was represented to be required, and the name of the dispenser, which book shall be open to inspection by the proper authorities and preserved for at least five years, the entry of each such sale to be signed by the dispenser. Any person violating any of the provisions of this section, except as otherwise provided by law, shall be adjudged guilty of a misdemeanor and be punished by a fine of not less than twenty-five dollars nor more than one hundred dollars, or by imprisonment in the county jail for not less than thirty days nor more than ninety days, or by both fine and imprisonment, in the discretion of the court.

SEC. 2594. *Itinerant vendors of drugs*—Any itinerant vendor of any drug, nostrum, ointment, or appliance of any kind for the treatment of any disease or injury, and all those who by any method publicly profess to treat or cure diseases, injury or deformity, shall pay to the Treasurer of the Commission of Pharmacy an annual fee of one hundred dollars, upon the receipt of which the Secretary of the Commission shall issue a license for one year from its date. Two thousand dollars annually of the money arising from the license fund, or so much as may be needed shall be devoted to defraying the expenses of the Commission, and any balance remaining shall be paid into the State Treasury. Said Commission shall, on the first day of January of each year, make a verified and itemized statement in writing to the Auditor of State of all receipts and expenditures of money coming into their hands by virtue of their office. Any violation of this section shall be a misdemeanor, and any person shall, upon conviction thereof, pay a fine of not less than one hundred dollars, nor more than two hundred dollars. In actions or prosecutions under this chapter it need not be proven that the defendant has not a license, but such fact shall be a matter of defense.

SEC. 2595. *Penalty for false representations.*—If any person shall procure or attempt to procure a certificate of registry for himself or another by means of false representations or device, or without being a registered pharmacist shall conduct a place for retailing, compounding or dispensing drugs, medicines or chemicals, or for compounding or dispensing physicians' prescriptions, or shall use or exhibit the title of registered pharmacist, he shall be guilty of a misdemeanor, and each several day a place shall be so used shall be held to be a separate and several offense.

SEC. 2596. *Revocation of certificate.*—When a registered pharmacist has been convicted of a violation of the provisions of this chapter, in addition to the other penalties provided by law, the commission, in its discretion, may revoke his certificate of registry.

**CHAPTER 11, TITLE 12, AS AMENDED BY TWENTY-SEVENTH
GENERAL ASSEMBLY.**

INSPECTION OF PETROLEUM PRODUCTS.

SECTION 2503. The Governor shall appoint such number of inspectors of the products of petroleum as may be determined by the State Board of Health, not to exceed fourteen in number. Each inspector shall be a resident of the State and not interested directly or indirectly in the manufacture or sale of products of petroleum. His term of office shall begin on the first day of July in each even numbered year. He shall give bond to the State in the penal sum of five thousand dollars, conditional for the faithful performance of his duties, with sureties who shall, in addition to the usual justification, make oath, entered on the bond, that they are not directly or indirectly interested in the manufacture or sale of products of petroleum for illuminating purposes, which bond shall be for the benefit of all persons injured through the failure of the inspector to perform his duties, and shall be filed with, and the sureties thereon approved by, the Secretary of State. (Where there are two or more inspection stations, under the jurisdiction of the same inspector, he may with the approval of the Governor appoint a deputy or deputies, each of whom shall be a resident of the State and not interested directly or indirectly in the manufacture and sale of petroleum products for all of whose official acts the principal shall be responsible, and who shall serve without additional compensation or expense to the State.)

SEC. 2504. The State Board of Health shall make rules and regulations for the inspection of petroleum products, for the government of inspectors, and prescribe the instruments and apparatus to be used. Such rules and regulations shall be approved by the Governor, and, when so approved, shall be binding upon all inspectors.

SEC. 2505. Each inspector shall be furnished, at reasonable expense to the State, with the necessary instruments and apparatus for testing, and shall promptly make inspection, and test and brand all illuminating oils kept for sale, and for such purpose may enter upon the premises of any person. He shall reject all oils for illuminating purposes which will emit a combustible vapor at a temperature of one hundred and five degrees, standard Fahrenheit thermometer, closed test, not less than one-half pint of oil to be used in the flash test. If upon test and examination the oil shall meet the requirements, he shall brand over his official signature and date the barrel or package holding the same, "Approved, flash test..... degrees," inserting in the blank the number. Should it fail to meet the requirements, it shall be branded under his official signature and date, "Rejected for illuminating purposes." All inspection shall be made

within the State, and paid for by the person for whom the inspection is made, at the rate of ten cents per barrel, fifty-five gallons for this purpose constituting a barrel, which charge shall be a lien upon the oil inspected, and be collected by the inspector, reported and paid into the State Treasury, except as otherwise provided in this chapter. For the purposes of this act, gasoline, benzine and naphtha shall be deemed illuminating oil. No gasoline shall be sold, given away or delivered to any person in this State until the package, cask, barrel or vessel containing the same has been plainly marked "Gasoline."

SEC. 2506. Each inspector shall keep an accurate record of all oils inspected and branded, the number of gallons, the number and kind of barrels or packages, the date and number of gallons approved, the number rejected, the name of the person for whom inspection was made, and the amount of money received therefor, the necessary traveling expenses incurred, the amount expended for instruments and apparatus, and the expenses incurred in prosecutions, which record at all reasonable times shall be open to public inspection. A copy of this record for the preceding month shall be filed with the Secretary of State on or before the fifteenth day of each month, and no item of expenses shall be allowed and paid not shown in such reports.

SEC. 2507. Each inspector shall be allowed as full compensation for his services all fees and commissions earned and collected by him up to \$50 per month, and 25 per cent of any sum collected in any one month in excess of \$50, but in no case shall his compensation exceed \$100 per month. He shall be allowed such other sum as he necessarily expends for prosecutions incurred in the discharge of his duties and for necessary help in branding barrels. All money collected by the inspector in excess of the allowance herein provided shall, on or before the fifteenth day of each month, be paid to the State Treasurer. Should any inspector pay out more money in any one month for necessary expenses incurred, for prosecutions for the violation of the provisions of this chapter, or for necessary help in branding barrels, than fees collected, such excess shall be refunded to him on his filing a sworn itemized statement with the Governor, showing fees collected and expenses paid or incurred, which statement must be approved by the Governor.

SEC. 2508. If any person, company or corporation, or agent thereof, shall sell, or attempt to sell, any product of petroleum for illuminating purposes which has not been inspected and branded as in this chapter provided, or shall falsely brand any barrel or package containing such petroleum product, or shall refill with products of petroleum barrels or packages having the inspector's brand thereon, without erasing such brand and having the contents thereof inspected, and the barrel or package rebranded, or shall purchase, sell or dispose of any empty barrel or package without thoroughly removing the inspection brand, or shall knowingly or negligently sell, or cause to be sold, or shall use or cause to be used, any product of petroleum mentioned in this chapter not inspected and tested, except as otherwise authorized herein; or if any person shall adulterate with any substance for the purpose of sale or use any product of petroleum to be used for illuminating purposes in such a manner as to render it dangerous, or shall sell or offer for sale, or use any product of petroleum for illuminating purposes which will emit a combustible vapor at a temperature of less

than 105 degrees, standard Fahrenheit thermometer, closed test, except as otherwise provided in this section for illuminating railway cars, boats and public conveyances, and except that the gas or vapor thereof shall be generated in closed reservoirs outside the building to be lighted thereby, and except the lighter products of petroleum when used in the Welsbach hydrocarbon incandescent lamp, and for street light by street lamps, shall be fined not less than \$10 nor more than \$50; or if any common carrier shall receive for transportation or transport in the State as freight any oil or fluid, whether composed wholly or in part of petroleum or its products, or of any substance which will ignite at a temperature of 300 degrees Fahrenheit thermometer, open test; or if any such carrier of passengers shall burn any oil or fluid which will ignite at a temperature of 300 degrees for lighting any lamp, vessel or fixture of any kind in any railway passenger, baggage, mail or express car, or boat or street railway car, stage-coach, or other means of public conveyance, or if any inspector shall falsely brand any barrel or package, or shall practise any fraud or deceit in office, or be guilty of any official misconduct, or culpable negligence to the injury of another, or shall deal or have any pecuniary interest, directly or indirectly, in any oils or fluids sold for illuminating purposes while holding such office, he or such person, company, corporation or agent, shall be fined not less than \$50, and be liable in a civil action for all damages which may be sustained on account thereof, and each such inspector shall be fined in a sum not less than \$10 nor more than \$1,000, or imprisonment in the county jail not exceeding six months, or be punished by both fine and imprisonment.

SEC. 2509. It shall be the duty of the Governor to remove from office an inspector who is incompetent or unfaithful in the discharge of his official duty or, having knowledge of the violation of any of the provisions of this chapter, shall neglect or refuse to prosecute the offender.

SEC. 2510. The Secretary of State shall make and deliver to the Governor a report, for the fiscal year ending on the 30th day of June in each odd-numbered year, of all inspections made, the receipts and expenditures therefor, and such other items as are by this chapter required to be made of record.

CHAPTER 9, TITLE 12, CODE, AS AMENDED BY TWENTY-SEVENTH GENERAL ASSEMBLY.

TO PROHIBIT THE USE OF IMPURE OIL IN COAL MINES.

SECTION 2493. Only pure animal or vegetable oil, paraffine or electric lights shall be used for illuminating purposes in any mine in this State, and for the purpose of determining the purity of oils the State Board of Health shall fix a standard of purity and establish regulations for testing said oil, and said standard and regulations, when so determined, shall be recognized by all the courts of the State.

SEC. 2494. Any person, firm or corporation, either by themselves, agents or employes, selling or offering to sell for illuminating purposes in any mine in this State any adulterated or impure oil, or oil not recognized

by the State Board of Health as suitable for illuminating purposes as contemplated in this chapter, shall be deemed guilty of a misdemeanor, and, upon conviction thereof, shall be fined not less than \$25 nor more than \$100 for each offense, and any mine owner or operator, or employe of such owner or operator who shall knowingly use, or any mine operator who shall knowingly permit to be used, for illuminating purposes in any mine in this State any impure or adulterated oil that has not been inspected and approved by an inspector, or any oil the use of which is forbidden by this chapter, shall, upon conviction thereof, be fined not less than \$5 nor more than \$25.

SEC. 2495. It shall be the duty of an inspector of petroleum products to inspect and test all oil offered for sale, sold, or used for illuminating purposes in coal mines, in this State, and for such purpose he may enter upon the premises of any person. If upon tests and examination the oil shall meet the requirements made and provided by the State Board of Health, he shall brand, over his own official signature and date, the barrel or vessel holding the same with the words "Approved for illuminating coal mines." Should it fail to meet such requirements, he shall brand it over his official signature and date, "Rejected for illuminating coal mines." All inspection shall be made within this State, and paid for by the person for whom the inspection is made at the rate of 10 cents per barrel or vessel, which charge shall be a lien on the oil inspected, and be collected by the inspector. Each inspector shall be governed in all things respecting his record, compensation, expenses, and returns to the Treasurer of State and Secretary of State as provided in sections 2506 and 2507 of the code. It shall be the duty of the inspector whenever he has good reason to believe that oil is being sold or used in violation of the provisions of this chapter to make complaint to the county attorney of the county in which the offense was committed, who shall forthwith commence proceedings against the offender, in any court of competent jurisdiction. All reasonable expenses for analyzing suspected oil shall be paid by the owner of the oil whenever it is found that he is selling or offering to sell impure oil in violation of the provisions of this chapter. Such expenses may be recovered in a civil action, and in criminal proceedings such expenses shall be taxed as part of the costs.

SEC. 2496. The provisions of this chapter shall apply only to coal mines.

CHAPTER 52, ACTS OF THE TWENTY-SEVENTH GENERAL ASSEMBLY.

RELATING TO THE ADULTERATION OF, AND DECEPTION IN THE SALE OF LINSEED OR FLAXSEED OIL.

SECTION 1. *Manufacture—sale.*—No person, firm, or corporations shall manufacture or mix for sale, sell, or offer for sale, as raw linseed oil, any article which is not wholly the product of commercially pure linseed or flaxseed. Nor shall any person, firm, or corporation manufacture or mix for sale, sell, or offer for sale, as boiled linseed oil, any article, unless the oil from which said article is made be wholly the product of commercially

pure linseed or flaxseed, and unless the same has been heated to at least two hundred and twenty-five (225) degrees Fahrenheit.

SEC. 2. *Compounds excepted.*—Nothing in this act shall be construed as prohibiting the sale or manufacture of any compound of linseed or flaxseed oil; provided, that such compound, if it imitates in appearance and is designed to take the place of linseed or flaxseed oil, shall not be manufactured or mixed for sale, sold, or offered for sale under a name or description containing the word "linseed oil" or "flaxseed oil."

SEC. 3. *Penalty.*—Any person, firm, or corporation who shall violate any of the provisions of this act shall be guilty of a misdemeanor, and upon conviction thereof shall be punished for each and every such violation, by a fine of not less than fifty (50) dollars, nor more than five hundred (500) dollars; and in default of the payment of such fine shall be committed to the county jail for a period of not less than thirty (30) days.

SEC. 4. *Duties and powers of inspectors and Board of Health.*—It shall be duty of the inspectors of petroleum products, under such rules and regulations as the State Board of Health may prescribe, to enforce the provisions of this act. The violation of any of the provisions of this act relating to the manufacture and adulteration of linseed or flaxseed oil is hereby declared to be a public nuisance, and any court of competent jurisdiction is authorized, upon application of the Board of Health or its agents, to enjoin such violation, in the same manner as injunctions are usually granted under the rules and practice of such court. The board, its inspectors, assistants, experts, and chemists, and others appointed by it, shall have access, ingress, and egress to and from all places of business and buildings where linseed or flaxseed oil is kept for sale, stored or manufactured. They shall also have the power to open any tank, barrel, can, or vessel containing such oil, and may inspect the contents thereof, and take samples therefrom for analysis. All clerks, bookkeepers, express agents, railroad agents, or officials, employes of common carriers, or other persons, shall render them all the assistance in their power, when so requested, in tracing, finding, or inspecting such oil.

SEC. 5. *Cost of analysis—County Attorney.*—It shall be the duty of the court in every action brought under this act to tax as costs in the cause, the actual and necessary expense of analyzing the linseed or flaxseed oil which shall be in controversy in such proceeding; provided, that the amount so taxed shall not exceed the sum of twenty-five (25) dollars. It shall be the duty of the county attorney, upon the application of the State Board of Health, to attend to the prosecution in the name of the State, of any suit brought for violation of any of the provisions of this act within his county.

OPIMUM SMOKING.

SEC. 5003. Any person who shall keep and maintain any shop, house, room or other place to be resorted to by other persons, in which opium or any of its preparations or compounds is sold or given away to be smoked or used in such place, or who allows opium or any of its preparations to be smoked in such shop, house, room or other place, and every person who resorts to such shop, house, room or other place for the purpose of smoking opium or its preparations and compounds, shall be deemed guilty of a misdemeanor and upon conviction thereof shall be fined not exceeding five

hundred dollars, or imprisoned in the county jail not exceeding six months, or both.

The State, upon the trial of any person indicted for keeping a place described in this section, may, for the purpose of establishing the character of the place so kept by the defendant, introduce evidence of the general reputation of such place so kept, and such evidence shall be competent for such purpose.

SELLING FIREARMS TO MINORS.

SEC. 5004. No person shall knowingly sell, present or give any pistol, revolver or toy pistol to any minor. Any violation of this section shall be punished by a fine of not less than twenty-five nor more than one hundred dollars, or by imprisonment in the county jail not less than ten nor more than thirty days.

SALE OF TOBACCO TO MINORS.

SEC. 5005. No person shall directly or indirectly, by himself or agent, sell, barter or give to any minor under sixteen years of age any cigar or tobacco in any form whatever, except upon the written order of his parent or guardian. Any violation of this section shall be punished by a fine of not less than five nor more than one hundred dollars, and the offender shall stand committed until fine and costs of prosecution are paid.

SALE OF CIGARETTES.

SEC. 5006. No one, by himself, clerk, servant, employe or agent, shall, for himself or any person else, directly or indirectly, or upon any pretense, or by any device, manufacture, sell, exchange, barter, dispense, give in consideration of the purchase of any property, of any service, or in evasion hereof, or keep for sale, any cigarettes or cigarette paper or cigarette wrappers, or any paper made or prepared for the purpose of making cigarettes, or for the purpose of being filled with tobacco for smoking; or own or keep, or be in any way concerned, engaged or employed in owning or keeping, any such cigarettes or cigarette paper or wrappers, with intent to violate any provision of this section or authorize or permit the same to be done. Whoever is found guilty of violating any of the provisions of this section, for the first offense shall pay a fine of not less than twenty-five dollars nor more than fifty dollars and costs of prosecution, and stand committed to the county jail until fine and costs are paid; for the second and each subsequent offense, he shall pay, upon conviction thereof, a fine of not less than one hundred dollars nor more than five hundred dollars and the costs of prosecution, or be imprisoned in county jail not to exceed six months: *provided* that the provisions hereof shall not apply to the sales of jobbers doing an interstate business with customers outside the State.

USE OF BARBED WIRE.

SEC. 2817. Barbed wire shall not be used to inclose any school buildings or grounds, nor for any fence or other purpose within ten feet of any such grounds. Any person violating the provisions of this section shall be punished by a fine not exceeding twenty-five dollars.

MINERS—PROVISIONS FOR THEIR SAFETY.

SEC. 2486. *Escape and air shafts.*—The owner or person in charge of any mine operated by shaft, or one having a slope or drift opening in which five or more men are employed, shall construct and maintain at least two distinct openings for each seam of coal worked, which in shaft mines shall be separated by natural strata of not less than one hundred feet in breadth, and in slope or drift mines not less than fifty feet in breadth through which ingress and egress at all times shall be unobstructed to the employes, and in slope or drift mines shall be provided with safe and available traveling-ways; all traveling-ways and escapes to be kept free from water and fall of roof. All escape-shafts not provided with hoisting appliances as hereinafter provided shall have stairs at an angle of not more than 60° in descent, kept in safe condition, with proper landings at easy and convenient distances apart. He shall provide all air-shafts where fans are used with working fans for ventilation, and those used for escapes with suitable appliances for hoisting underground workmen, at all times ready for use while the men are at labor, and no combustible material shall be allowed to be or remain between any escape-shaft and hoisting-shaft, save as it may be absolutely necessary in the operation of the mine. A furnace-shaft, if large enough, may be divided into an escape and a furnace-shaft, the partition to be of incombustible material for a distance of not less than fifteen feet from the bottom thereof, and so constructed throughout as to exclude the heated air and smoke from the side used as an escape-shaft. Where two or more mines are connected underground, the several owners, by joint agreement, may use the hoisting shaft or slope of the one as an escape for the other. In all cases where escape-shafts are constructed less than one hundred feet from the hoisting-shaft, there shall be built and maintained an under-ground traveling-way from the top of the escape-shaft, so as to furnish the proper protection from fire for a distance of one hundred feet from such hoisting-shaft.

No escape-shaft shall be located or constructed without first giving notice to the district inspector, who shall determine the distance it shall be from the main shaft, and without his consent it shall not be less than 300 feet, nor shall any building except the fan-house be placed nearer than 100 feet of the escape; but the provisions of this chapter relating to escape-ways shall not apply to mines where the same are lost or destroyed by reason of the drawing of pillars preparatory to the abandonment of the mine, and in such mine not more than twenty persons shall be employed at one time.

SEC. 2488. *Ventilation.*—The owner or person in charge of any mine shall provide and maintain, whether the mine be operated by shaft, slope or drift, an amount of ventilation of not less than 100 cubic feet of air per minute for each person, nor less than 500 cubic feet of air per minute for each mule or horse employed therein, which shall be so circulated throughout the mines as to dilute, render harmless and expel all noxious and poisonous gases in all working parts of the same; to do this, artificial means by exhaust-steam, forcing-fans, furnaces, or other contrivances of sufficient capacity and power, shall be kept in operation. If a furnace is used, it shall be so constructed, by lining the up-cast for a sufficient distance with incombustible material, that fire cannot be communicated to any part of

the works. When the mine inspector shall find the air insufficient, or the men working under unsafe conditions, he shall at once give notice to the mine owner or his agent or person in charge, and, upon a failure to make the necessary changes within a reasonable time, to be fixed by him, he may order the men out, to remain out until the mine is put in proper condition.

SEC. 2489. *Safety appliances—competent engineers—boys not employed.*—The owner or person in charge of any mine shall in all mines operated by shaft or slope, where the voice cannot be distinctly heard, provide and maintain a metal speaking-tube or other means of communication, kept in complete order from the bottom or interior to the top or exterior, also a sufficient safety catch and proper cover overhead on all cages, and an adequate brake to all drums or other devices used for lowering or hoisting persons, an approved safety gate at the top of each shaft, springs at the top of each slope, and a trail attached to each train used therein. He shall not knowingly place in charge of any engine used in or about the operation of the mines any but experienced, competent and sober engineers, who shall not allow anyone but those designated for that purpose to handle or in any way interfere with it or any part of the machinery, nor shall more than ten persons be allowed to descend or ascend in any cage at one time, or such less number as may be fixed by the district mine inspector, nor any one but the conductor on a loaded cage or car. He shall not allow a boy under 12 years of age to work in the mines, and, when in doubt regarding the age of one seeking employment, shall, before engaging him, obtain the affidavit of the applicant's parent or guardian in regard thereto. He shall at all times keep a sufficient supply of timber to be used as props, convenient and ready for use, and shall send such props down when required and deliver them to the places where needed.

TO PREVENT ACCIDENTS BY RAILWAYS.

SEC. 2054. *Cattle-guards — crossings — signs.*—Every corporation constructing or operating a railway shall make proper cattle-guards where the same enters or leaves any improved or fenced land, and construct at all points where such railway crosses any public road good, sufficient and safe crossings and cattle-guards, and erect at such points, at a sufficient elevation from such road as to admit of free passage of vehicles of every kind, a sign with large and distinct letters placed thereon, to give notice of the proximity of the railway, and warn persons of the necessity of looking out for trains. Any railway company neglecting or refusing to comply with the provisions of this section shall be liable for all damages sustained by reason of such refusal or neglect, and it shall only be necessary, in order to recover, for the injured party to prove such neglect or refusal.

SEC. 2060. *Interlocking switches.*—When in any case two or more railroads cross each other at a common grade, or a railroad crosses a stream by swing or draw bridge, they may be equipped thereat with an interlocking switch system, or other suitable safety device rendering it safe for engines or trains to pass thereover without stopping, and if such interlocking switch system or other safety device shall have been approved by the Railroad Commissioners, then the engines and trains of such railroad or railroads may pass over such crossings or bridge without stopping, the provisions of any other law to the contrary notwithstanding.

SEC. 2071. *Liability for negligence or wrongs of employees.*—Every corporation operating a railway shall be liable for all damages sustained by any person, including employees of such corporation, in consequence of the neglect of the agents, or by any mismanagement of the engineers or other employees thereof, and in consequence of the wilful wrongs, whether of commission or omission, of such agents, engineers or other employees, when such wrongs are in any manner connected with the use and operation of any railway on or about which they shall be employed, and no contract which restricts such liability shall be legal or binding.

SEC. 2072. *Signals at road crossings.*—A bell and a steam whistle shall be placed on each locomotive engine operated on any railway, which whistle shall be twice sharply sounded at least sixty rods before a road crossing is reached, and after the sounding of the whistle the bell shall be rung continuously until the crossing is passed; but at street crossings within the limits of cities or towns the sounding of the whistle may be omitted, unless required by ordinance or resolution of the council thereof; and the company shall be liable for all damages which shall be sustained by any person by reason of such neglect. Any officer or employee of any railway company violating any of the provisions of this section shall be punished by a fine not exceeding \$100 for each offense.

SEC. 2073. *Stopping at railway crossings.*—All trains run upon any railroad in this State which intersects or crosses any other railroad upon the same level shall be brought to a full stop at a distance of not less than 200 feet nor more than 800 feet from the point of intersection or crossing, before such intersection or crossing is passed, except as otherwise provided in this chapter. Any engineer violating the provisions of this section shall forfeit \$100 for each offense, to be recovered in an action in the name of the State for the benefit of the school fund, and the corporation on whose road such offense is committed shall forfeit the sum of \$200 for each offense, to be recovered in like manner.

SEC. 710. *Dangerous buildings.*—They (cities and towns) shall have power to provide by ordinance for the repair, removal or destruction of any building which is dangerous, or which may be liable to fall, and to levy and collect a special tax against the property and owner thereof for the expense thereof, as other special taxes are levied and collected.

SEC. 711. *Fires—electric apparatus—fire limits.*—They shall have power to make regulations against danger from accidents by fire or electrical apparatus, to establish fire limits, and to prohibit within such limits the erection of any building or addition thereto, unless the outer walls be made of brick, iron, stone, mortar, or other non-combustible material, with fire-proof roofs, and to provide for the removal of any structure erected contrary to such prohibition.

SEC. 712. *Fire escapes.*—They shall have power * * * to require the construction of fire escapes to buildings, and regulate and control the same; to cause all buildings, structures and enclosures that may be in such condition as to cause danger from falling to be fixed, or from fire to be immediately made safe or removed.

SEC. 713. *Inspection of steam boilers and magazines.*—They shall have power to provide for the inspection of steam boilers, and all places used for the storage of explosives or inflammable substances or materials, and to

prescribe the necessary means and regulations to secure the public against accidents and injuries therefrom, and to assess the costs and expenses of such proceedings against the property and owners thereof in the manner provided for special assessments.

SEC. 2074. *Contract or rule limiting liability.*—No contract, receipt, rule or regulation shall exempt any railway corporation engaged in transporting persons or property from the liability of a common carrier, or carrier of passengers, which would exist had no contract, receipt, rule or regulation been made or entered into.

SEC. 2079. *Couplers on new or repaired cars.*—No corporation, company or person operating any line of railroad within this State, or any car manufacturer or transportation company using or leasing cars therein, shall put in use any new car or any old one that has been to the shop for general repairs to one or both of its drawbars, that is not equipped with automatic couplers so constructed as to enable any person to couple or uncouple them without going between them.

SEC. 2080. *On all cars.*—After January 1, 1898, no corporation, company or person, operating a railroad, or any transportation company using or leasing cars, shall have upon any railroad in this State any car that is not equipped with such safety automatic coupler.

SEC. 2081. *Driver brake on engines.*—No corporation, company or person operating any line of railroad in the State shall use any locomotive engine upon any railroad or in any railroad yard in the State that is not equipped with a proper and efficient power brake, commonly called a "driver brake."

SEC. 2082. *Power brake on cars.*—No corporation, company or person operating a line of railroad in the State shall run any train of cars that shall not have therein a sufficient number of cars with some kind of efficient automatic or power brake to enable the engineer to control the train without requiring brakemen to go between the ends or on the top of the cars to use the hand brake.

SEC. 2083. *Penalty.*—Any corporation, company or person operating a railroad in this State and using a locomotive engine, or running a train of cars, or using any freight, way or other car contrary to the provisions of the four preceding sections, shall be guilty of a misdemeanor, and shall be subject to a fine of not less than five hundred nor more than one thousand dollars for each and every offense; but such penalties shall not apply to companies hauling cars belonging to railroads other than those of this State which are engaged in interstate traffic. Any railway employe who may be injured by the running of such engine, train or car contrary to the provisions of said sections shall not be considered as waiving his right to recover damages by continuing in the employ of the corporation, company or person operating such engine, train or cars.

SEC. 2403. *Selling or giving (intoxicating liquors) to minor or intoxicated person or person in the habit of becoming intoxicated.*—No person by himself, agent or otherwise, shall sell or give any intoxicating liquors to any minor for any purpose, except upon written order of his parent, guardian or family physician, or sell the same to any intoxicated person or one in the habit of becoming intoxicated. Any person violating the provisions of this section shall forfeit and pay the sum of \$100, to be collected by action against him, or, if a permit holder, against him and the sureties on his

bond. Such action may be brought by any citizen of the county. One-half of the amount so collected shall go to the informer and one-half to the school fund of the county.

SEC. 2418. *Civil action for damages by wife, parent, child, etc.*—Every wife, parent, guardian, employer or other person who shall be injured in person or property or means of support by any intoxicated person, or in consequence of the intoxication, habitual or otherwise, of any person, shall have a right of action in his or her own name against any person who shall, by selling or giving to another contrary to the provisions of this chapter any intoxicating liquors, cause the intoxication of such person, for all damages actually sustained, as well as exemplary damages; and a married woman shall have the same right to bring suits, prosecute, and control the same and the amount recovered, as if a single woman; and all damages recovered by a minor under this section shall be paid either to such minor or his parent, guardian or next friend, as the court shall direct, and all suits for damages under this section shall be by civil action in any court having jurisdiction thereof.

SEC. 4727. *Murder.*—Whoever kills any human being with malice aforethought, either expressed or implied, is guilty of murder.

SEC. 4728. *First degree.*—All murder which is perpetrated by means of poison, or lying in wait, or any other kind of wilful, deliberate and premeditated killing, or which is committed in the perpetration or attempt to perpetrate any arson, rape, robbery, mayhem or burglary, is murder in the first degree, shall be punished with death, or imprisonment for life at hard labor in the penitentiary, as determined by the jury, or by the court if the defendant pleads guilty.

SEC. 4729. *Second degree.*—Whoever commits murder otherwise than as set forth in the preceding section is guilty of murder of the second degree, and shall be punished by imprisonment in the penitentiary for life, or for a term of not less than ten years.

SEC. 4747. *Killing in duel.*—Whoever fights a duel with deadly weapons, and inflicts a mortal wound on his antagonist, is guilty of murder in the first degree, and shall be punished accordingly.

SEC. 4748. *Duelling—challenge.*—Any person who fights a duel with deadly weapons, or is present thereto as aid, second or surgeon, or advises, encourages or promotes the same, although no homicide ensue; and any person who challenges another to fight a duel, or sends or delivers any verbal or written message purporting or intended to be such challenge, although no duel ensue, shall be fined in a sum not exceeding \$1,000 nor less than \$400, and imprisoned in the penitentiary not more than three nor less than one year.

SEC. 4751. *Manslaughter.*—Any person guilty of the crime of manslaughter shall be imprisoned in the penitentiary not exceeding eight years, and fined not exceeding one thousand dollars.

SEC. 4752. *Maiming or disfiguring.*—Any person, with intent to maim or disfigure, cut or maim the tongue; cut out or destroy an eye; cut, slit or tear off an ear; cut, bite, slit or mutilate the nose or lip; cut off or disable a limb or any member of another person, he shall be imprisoned in the penitentiary not more than five years, and fined not exceeding one thousand nor less than one hundred dollars.

SEC. 4759. *Attempt to produce miscarriage.*—If any person, with intent to produce the miscarriage of any pregnant woman, wilfully administer to her any drug or substance whatever, or, with such intent, use any instrument or other means whatever, unless such miscarriage shall be necessary to save her life, he shall be imprisoned in the penitentiary for a term not exceeding five years, and be fined in a sum not exceeding \$1,000.

SEC. 4766. *Exposing child.*—If the father or mother of any child under the age of 6 years, or any person to whom such child has been intrusted or confided, expose such child in any highway, street, field, house or out-house, or any other place, with intent wholly to abandon it, he or she, upon conviction thereof, shall be imprisoned in the penitentiary not exceeding five years.

SEC. 4768. *Assault with intent to murder.*—If any person assault another with intent to commit murder, he shall be imprisoned in the penitentiary not exceeding ten years.

SEC. 4771. *With intent to inflict great bodily injury.*—If any person assault another with intent to inflict a great bodily injury he shall be imprisoned in the county jail not exceeding one year, or be fined not exceeding five hundred dollars.

SEC. 4773. *Mingling poison with food, etc.*—If any person mingle any poison with any food, drink or medicine, with intent to kill or injure any human being, or wilfully poison any spring, well, cistern or reservoir of water, he shall be imprisoned in the penitentiary not exceeding ten years, and be fined not exceeding \$1,000.

SEC. 4775. *Carrying concealed weapons.*—If any person carry upon his person any concealed weapon, or shall wilfully draw and point a pistol, revolver or gun at another, he shall be guilty of a misdemeanor, and be fined not more than \$100, or imprisoned in the county jail not more than thirty days; but this section shall not apply to police officers and other persons whose duty it is to execute process or warrants, or make arrests.

SEC. 4776. *Burning inhabited dwelling in nighttime.*—If any person wilfully or maliciously burn in the nighttime the inhabited building, boat or vessel of another, or wilfully and maliciously set fire to any other building, boat or vessel owned by himself or another, by the burning whereof such inhabited building, boat or vessel is burnt in the nighttime, he shall be imprisoned in the penitentiary for life or any term of years.

SEC. 4796. *Death caused by dynamiting.*—If any person wilfully deposits or throws in, under or about any dwellinghouse, building, boat, vessel or raft or other inhabited place, where its explosion will or is likely to destroy or injure the same, any dynamite, nitroglycerine, giant powder or other material, and by reason of the explosion thereof any person is killed, he shall be guilty of murder.

SEC. 4797. *Or injury to person.*—If any person wilfully deposits or throws any dynamite, nitroglycerine or giant powder or other explosive material as provided in the preceding section, and by means of the explosion thereof any person is injured, he shall be guilty of an assault with intent to commit murder.

SEC. 4809. *Placing obstructions on railways.*—If any person shall wilfully and maliciously place any obstruction on the track of any railroad in the State, or remove any rail therefrom, or in any other way injure such rail-

road, or do any other thing thereto whereby the life of any person is or may be endangered, he shall be imprisoned in the penitentiary for life, or for any term not less than two years.

SEC. 4810. *Shooting or throwing at train*.—If any person throw any stone or other substance whatever, or present or discharge any gun, pistol or other firearm at any railroad train, car or locomotive engine, he shall be guilty of a misdemeanor.

SEC. 4812. *Uncoupling locomotive or cars*.—If any person shall wilfully and maliciously uncouple or detach the locomotive or tender or any of the cars of any railroad train, or in any manner aid, abet or procure the doing of the same, such person shall be imprisoned in the penitentiary not exceeding five years, or be fined not exceeding one thousand dollars, or both, at the discretion of the court.

SEC. 4945. *Violating sepulchre*.—If any person, without lawful authority, wilfully dig up, disinter, remove or carry away any human body, or the remains thereof, from its place of interment; or aid, assist, encourage, incite or procure the same to be done or attempted, * * * he shall be imprisoned in the penitentiary not more than two years, or be fined not exceeding twenty-five hundred dollars, or both.

SEC. 5015. *Swine dying from disease*.—The owner or person having charge of any swine any of which die or are killed on account of any disease, shall upon such fact coming to his knowledge, immediately burn the same.

SEC. 5016. *Not to be sold*.—No person shall sell or give away or offer for sale any swine that have died of any disease, or that have been killed on account of any disease.

SEC. 5017. *Nor conveyed along highway*.—No person shall convey upon or along any public highway or other public ground, or on any private land except that owned or leased by him, any diseased swine, or swine that have died of or have been killed on account of any disease. Upon the trial for the violations of the provisions of this section, the proof that any person has hauled or is hauling dead swine from a neighborhood in which swine have been dying, or are at the time dying, from any disease, shall be presumptive of his guilt.

SEC. 5019. *Penalty*.—Any person violating or failing to comply with any provision of the three preceding sections shall be fined not less than five nor more than one hundred dollars, or be imprisoned in the county jail not to exceed thirty days, or both.

SEC. 5025. *Boxing tumbling rods of threshing machines*.—If any person run any threshing machine in this State without having two lengths of tumbling rods next the machine together with the knuckles or joints and jacks of the tumbling rods safely boxed and secured while the machine is running, he shall be fined not less than ten nor more than fifty dollars for every day or part of day he shall violate this section.

SEC. 5026. *Steam boilers*.—Any persons owning or operating steam boilers in this State shall provide the same with steam gauge, safety-valve and water gauge, and keep the same in good order. Any person neglecting so to do shall be fined not less than fifty nor more than five hundred dollars.

SEC. 5036. *Engaging in prize fight*.—Whoever engages as principal in any prize fight shall be fined not less than one hundred nor more than one

thousand dollars, or be imprisoned in the penitentiary for a term of not more than one year, or both.

SEC. 5037. *Aiding or abetting.*—Whoever aids or assists in any prize fight shall be fined not exceeding five hundred dollars, or imprisoned in the county jail for not more than one hundred and fifty days.

SEC. 4989. *Sale of impure or skimmed milk—skimmed-milk cheese—labeling.*—If any person shall sell, exchange, or expose for sale or exchange, or deliver or bring to another, for domestic or potable use, or to be converted into any product of human food, any unclean, impure, unhealthy, adulterated, unwholesome or skimmed milk, or milk from which has been held back what is commonly known as strippings, or milk taken from an animal having disease, sickness, ulcers, abscess or running sore, or which has been taken from an animal within fifteen days before or five days after parturition; or if any person, having cows for the purpose of producing milk or cream for sale, shall stable them in an unhealthy place or crowded manner, or shall knowingly feed them food which produces impure, unwholesome milk, or shall feed them distilled glucose or brewery waste in any state of fermentation, or upon any substance in a state of putrefaction or rottenness or of an unhealthy nature, or shall sell or offer for sale cream which has been taken from milk the sale of which has been prohibited, or who shall sell or offer for sale, as cream, an article, which shall contain less than the amount of butter-fat as prescribed in this chapter; or if any person shall sell or offer for sale any cheese manufactured from skimmed milk, or from milk that is partly skimmed, without the same being plainly branded, stamped or marked on the side or top of both cheese and package, in a durable manner, in the English language, the words "Skimmed-milk cheese," the letters of the words to be not less than one inch in height and one-half inch in width, he shall be fined not less than \$25 nor more than \$100, and shall be liable for double damages to the person or persons upon whom such fraud shall be committed; but the provisions of this section shall not apply to skimmed milk when sold as such and in the manner and subject to the regulations prescribed in this chapter.

SEC. 4990. *What deemed adulterated or impure milk.*—For the purposes of this chapter, the addition of water or any other substance or thing to whole milk or skimmed milk or partially skimmed milk is hereby declared an adulteration, and milk which is obtained from animals fed upon waste as defined in this chapter, or upon any substance of an unhealthy nature, is hereby declared to be impure and unwholesome; milk which is proved by any reliable method of test or analysis to contain less than 12½ per cent. of milk solids to 100 pounds of milk, or three pounds of butter fat to 100 pounds of milk, shall be regarded as skimmed or partially skimmed milk, and every article not containing 15 per cent. or more of butter fat shall not be regarded as cream.

SEC. 4991. *Enforcement.*—It is hereby made the duty of the dairy commissioner to enforce the provisions of the two preceding sections.

SEC. 4992. *Fraud in lard—from diseased hogs.*—All persons or associations that engage in the business of selling lard rendered from swine that have died of disease shall, before selling or offering to sell any such lard, plainly stamp, print or write upon the cask, barrel or other vessel containing it the words, "Lard from hogs which have died of disease;" or, if sold

without such cask, barrel or other receptacles, the purchaser shall be informed that the lard is from hogs which have died of disease. For a violation of the provisions of this section he shall be fined not less than \$5 nor exceeding \$100, or imprisoned in the county jail not exceeding thirty days.

SEC. 4993. Compound lard-labeling.—No manufacturer or other person shall sell, deliver, prepare, put up, expose or offer for sale lard, or any article intended for use as lard, which contains any ingredient but the pure fat of healthy swine in any tierce, bucket, pail, package or other vessel or wrapper, or under any label bearing the words "pure," "refined," "family" or either of said words alone or in combination with other words of like import, unless every tierce, bucket, pail, package or vessel, wrapper or label in or under which said article is sold, delivered, prepared, put up, exposed or offered for sale bears on top or outer sides thereof, in letters not less than one-half inch in length, and plainly exposed to view, the words, "compound lard," and the name and proportion in pound and fractional parts thereof of each ingredient contained therein. Any person violating the provisions of this section shall be fined, for the first offense not less than twenty nor more than fifty dollars, and for each subsequent offense not less than fifty nor more than one hundred dollars.

SEC. 4994. Canned food—label.—It shall be unlawful for any packer of or dealer in hermetically sealed, canned or preserved fruits, vegetables or other articles of food, not including canned or condensed milk or cream, to knowingly offer such canned or preserved articles for sale for consumption in this State, unless the cans or jars which contain the same shall bear the name, address and place of business of the person, firm or corporation that canned or packed the articles so offered, or the name of the wholesale dealer in the State who sells or offers the same for sale, together, in all cases, with the name of the state, city, town or village, where the same were packed plainly written thereon, preceded by the words "packed at." Such name, address and place of business shall be plainly printed on the label, together with a mark or term indicating clearly the grade or quality of the articles contained therein.

SEC. 4995. Soaked goods.—All packers of and dealers in soaked goods, or goods put up from products dried or cured before canning, shall, in addition to complying with the provisions of the preceding section, cause to be plainly branded on the face of the label in legible type, one-half of an inch in height and three-eighths of an inch in width, the word "soaked."

SEC. 4996. Penalty.—Any packer or dealer who shall violate any of the provisions of the two preceding sections shall be fined not more than fifty dollars for each offense in the case of retail dealers, and in case of wholesale dealers or packers, not less than five hundred nor more than one thousand dollars for each offense.

SEC. 4997. Who deemed "packer" or "dealer."—The terms "packer" and "dealer," as used in the three preceding sections, shall include any firm or corporation doing business as a dealer in or packer of the articles mentioned therein.

SEC. 4998. Information by board of health.—It shall be the duty of any board of health, cognizant of any violation of the provisions of the four preceding sections, to inform the county attorney, whose duty it shall be to institute proceedings against any person who is charged with a violation

of such provisions, and in case of a conviction he shall receive twenty-five per cent. of the fines actually collected in addition to any salary otherwise provided for.

SEC. 4999. *Seats for female employes.*—All employers of females in any mercantile or manufacturing business or occupation shall provide and maintain suitable seats, when practicable, for the use of such female employes, at or beside the counter or work bench where employed, and permit the use thereof by such employes to such an extent as the work engaged in may reasonably admit of. Any neglect or refusal to comply with the provisions of this section by any employer shall be punished by a fine not exceeding ten dollars.

SEC. 5036. *Engaging in prize fight.*—Whoever engages as principal in any prize fight shall be fined not less than one hundred nor more than one thousand dollars, or be imprisoned in the penitentiary for a term of not more than one year, or both.

SEC. 5037. *Aiding or abetting.*—Whoever aids or assists in any prize fight shall be fined not exceeding five hundred dollars, or imprisoned in the county jail for not more than one hundred and fifty days.

SEC. 5039. *Racing or fast driving on highways.*—Any person who shall be guilty of racing or driving upon the public highway, in a manner likely to endanger the persons or lives of others, shall be guilty of a misdemeanor and shall be fined not exceeding one hundred dollars, or be imprisoned in the county jail not exceeding thirty days.

SEC. 5078. *What deemed nuisances.*—The erecting, continuing or using any building or other place for exercise of any trade, employment or manufacture which, by occasioning noxious inhalations, offensive smells or other annoyances, becomes injurious and dangerous to the health, comfort or property of individuals or the public; the causing or suffering any offal, filth or noisome substance to be collected or to remain in any place to the prejudice of others; the obstructing or impeding without legal authority the passage of any navigable river, harbor or collection of water; or the corrupting or rendering unwholesome or impure the water of any river, stream or pond; or unlawfully diverting the same from its natural course or state, to the injury or prejudice of others; and the obstructing or incumbering by fences, buildings or otherwise the public roads, private ways, streets, alleys, commons, landing places or burying-grounds, are nuisances.

SEC. 5079. *Manufacture of gunpowder.*—If any person carry on the business of manufacturing gunpowder, or of mixing or grinding the composition therefor, in any building within eighty rods of any valuable building erected at the time when such business may be commenced, the building in which such business is thus carried on is a public nuisance.

SEC. 5081. *Penalty—abatement.*—Whoever is convicted of erecting, causing or continuing a public or common nuisance as provided in this chapter (chapter 14, title xxiv), or at common law when the same has not been modified or repealed by statute, where no other punishment therefor is specially provided, shall be fined not exceeding \$1,000, and the court, with or without such fine, may order such nuisance abated, and issue a warrant as hereinafter provided.

SEC. 4976. *Sale of poison without label.*—If any apothecary, druggist or other person deliver to another any arsenic, corrosive sublimate, prussic

acid or other poisonous liquid or substance without having the word "poison" and the true name thereof written or printed upon a label attached to or affixed upon the vial, box or parcel containing the same, he shall be guilty of a misdemeanor.

SEC. 4977 *Spreading infectious disease.*—If any person inoculate himself or any other person or suffer himself to be inoculated with the smallpox within the State, or come in the State with intent to cause the prevalence or spread of this infectious disease, he shall be imprisoned in the penitentiary not more than three years, or be fined not exceeding \$1,000 and imprisoned in the county jail not exceeding one year.

SEC. 4978 *Putting infected person on public conveyance.*—If any person shall place or put, or aid or abet in placing or putting, any person upon any railroad car, steamboat or other public conveyance, knowing such person to be infected with diphtheria, smallpox or scarlet fever, he shall be fined not more than \$100, or be imprisoned in the county jail not more than thirty days.

SEC. 4979. *Throwing dead animals in stream, spring, etc.*—If any person throw, or cause to be thrown, any dead animal into any river, well, spring, cistern, reservoir, stream or pond, he shall be imprisoned in the county jail not less than ten nor more than thirty days, and be fined not less than \$5 nor more than \$100

SEC. 4980. *Selling drugged liquors.*—If any person wilfully sell or keep for sale intoxicating, malt or vinous liquors, which have been adulterated or drugged by admixture with any deleterious or poisonous substance, he shall be fined not exceeding five hundred dollars, or be imprisoned in the penitentiary not exceeding two years.

SEC. 4981. *Selling unwholesome provisions.*—If any person knowingly sell any kind of diseased, corrupted or unwholesome provisions, whether for meat or drink, without making the nature and condition of the same fully known to the buyer, he shall be imprisoned in the county jail not more than thirty days, or be fined not exceeding one hundred dollars

SEC. 4982. *Adulterating food or liquor.*—If any person adulterate for the purpose of sale any substance intended for food, or any wine, spirituous, malt or other liquor intended for drinking, he shall be imprisoned in the county jail not more than one year, or be fined not exceeding three hundred dollars, and the article so adulterated destroyed.

SEC. 4983. *Drugs or medicines.*—If any person adulterate for the purpose of sale any drug or medicine, in such a manner as to lessen the efficacy or change the operation of such drug or medicine, or to make it injurious to health, or sell it knowing that it is thus adulterated, he shall be imprisoned in the county jail not exceeding one year, or be fined not exceeding five hundred dollars, and such adulterated drugs and medicines destroyed.

SEC. 4984. *Other adulteration.*—No person shall mix, color, stain or powder, or order or permit any other person to mix, color, stain or powder, any article of food or confections with any ingredient or material so as to render the article injurious to health, with the intent that the same may be sold, and no person shall sell or offer for sale any such articles.

SEC. 4985. *With intent to sell.*—No person shall, except for the purpose of compounding in the necessary preparation of medicine, mix, color, stain or powder, or permit any other person to mix, color, stain or powder any

drug or medicine with any ingredients or materials, so as to affect injuriously the quality or potency of such drug or medicine, with the intent to sell the same, or shall offer for sale any such drug or medicine.

SEC. 4986. *Labeling*.—No person shall mix, color, stain or powder any article of food, drink or medicine, or any article which enters into the composition of food, drink or medicine, with any other ingredient or material, whether injurious to health or not, for the purpose of gain or profit, or sell or offer for sale the same, or order or permit any other person to sell or offer for sale any article so mixed, colored, stained or powdered, unless the same be so manufactured, used or sold or offered for sale, under its true and appropriate name, and notice that the same is mixed or impure is marked, printed or stamped upon each package, roll, parcel or vessel containing the same, so as to be and remain at all times readily visible, or unless the person purchasing the same is fully informed by the seller of the true names of the ingredients (if other than such as are known by the common name thereof) of such articles at the time of making the sale thereof or offering to sell the same; but nothing in this section shall prevent the use of harmless coloring material used in coloring butter and cheese.

SEC. 4987. *Glucose—skimmed-milk cheese—oleomargarine*.—No person shall mix any glucose or grape sugar with syrup or sugar intended for human food, or shall mix or mingle any glucose or grape sugar with any article, without distinctly marking, stamping or labeling the article or the package containing the same with the true and appropriate name of such article, and the percentage in which glucose or grape sugar enters into its composition. Nor shall any person sell or offer for sale, or permit to be sold or offered for sale, any such food, into the composition of which glucose or grape sugar has entered, without at the same time informing the buyer of the fact, and the proportion in which glucose or grape sugar has entered into the composition.

SEC. 4988. *Penalty*.—Any person violating any provision of the four preceding sections shall, for the first offense, be fined not less than ten nor more than fifty dollars; for the second offense, not less than twenty-five nor more than one hundred dollars, or imprisoned in the county jail for not more than thirty days; for the third or any subsequent offense, not less than five hundred nor more than one thousand dollars, and imprisoned in the penitentiary not less than one nor more than five years.

XXXV.

INDEX.

	PAGE
Abating nuisances.....	64, 502
Accidents, railway	197, 572
Actinomycosis	163
American Public Health Association.....	20, 49, 56
Animals, domestic	248, 545
Anthrax (splenic fever).....	164
from a bacterial standpoint (Archibald)	415
Apthæ epizooticæ (foot and mouth disease)	165
Archibald, Dr. R. Alexander.....	415
Armstrong, J. A.....	101, 103
Attorney-General (Remley).....	16, 94, 240
Auditing committee.....	15, 32, 45, 65, 90
Audubon (smallpox).....	98
Bacteria, in the dairy	321
milk.....	317
Bacteriology, sanitary (Grimes).....	244
Bailey, L. H.	262
Bailey, Dr. William.....	21
Bailey, Dr. W. W.	119
Ballard, E. A , Deputy Oil Inspector	11
Bancroft, W.	12, 54, 65
Banning, Dr. C. W.	125
Barbed wire, use of	570
Barber, Dr. Elmer D.....	234
Barbers and hair dressers.....	195
Biennial report (ninth).....	17
Blockton, diphtheria at	23
Bloom, J. K.	214
Board meetings	11, 15, 17, 28, 35, 36, 46, 54, 67, 70, 84
members of.....	5
Bogan, Dr. W. L.....	91, 100, 101, 102, 104
Bowen, Dr. C. B.....	211
Brown, C. C.....	125
Bubonic plague	165
Buell, S. T.....	99
Burd, Dr. Edwin.....	114
Burial permits	74, 156

	PAGE
Burials	488, 510, 519
Care of the sick	482
Carter, Dr. E. H.	15, 24
Car sanitation	21
Cedar Falls, water	210
Cemeteries	64
Cemetery, water pollution	24
Centerville, water	211
Cerebro-spinal meningitis	88, 172, 246
Chicken pox	173, 235
Children's eyesight (Woods)	434
Cholera	173
Chronic insane, better care for (Gilman)	456
Cigarettes, sale of	570
Circulars	478
contagious diseases among domestic animals	535
contagious diseases in schools	495
disinfection of rag mattresses, etc.	536
information respecting tuberculosis	538
inspection of illuminating and linseed oils	523
local boards of health	498
ordinance for cities and towns	505
quarantine and disinfection	479
rules and regulations of townships	516
transportation of corpses	540
use of kerosene and gasoline	531
Clinton, water	211
Committees, standing	46, 88
Communicable diseases	163
actinomycosis	163
anthrax	164
apthæ epizooticæ	165
bubonic plague	165
cerebro-spinal meningitis	172
chicken pox	173
cholera	173
dengue	176
diphtheria	176
erysipelas	178
glanders (farcy)	179
goitre	181
gonorrhœa	181
influenza	182
leprosy	182
measles	183
mumps	183
pneumonia	185
purulent ophthalmia	185
rabies	185
relapsing fever	186

	PAGE
Communicable diseases—continued—	
rotheln	187
scarlet fever	187
smallpox	188
syphilis	189
tetanus	189
trichinosis	189
tuberculosis	190
typhoid fever	191
typhus	192
whooping cough	193
yellow fever	193
Conference of State and Provincial Boards of Health	50
Connelly, Dr. William	107, 108
Conniff, Dr. Robert E.	20, 45, 46, 67, 69, 75
Contagion, spread of	247
Contagious diseases	516
animals	30, 545
in public schools	495
Contents, table of	9
Conway, C. M.	215
Corning, water	213
Corpses	12, 18, 27, 40, 50, 54, 540
Cover, Dr. O. A.	124
Cream	290
Cresco, smallpox	106, 107, 108
Dairy, employes	331
fifty rules for	344
herds	329
house	334
stables	325, 331
Davenport, smallpox	121
Dead, the	487, 519
Deaths in State institutions	209
by railway accident	197
Delegates	49, 50, 75
Dengue	176
Des Moines, vaccination	96
Dickinson, Warren	15, 50
Dickinson, Dr. W. H.	51, 55
Diphtheria	23, 24, 25, 176, 235, 483, 497
Diseased animals	513, 520, 549
Disinfectants	22, 37, 74, 491
Disinfection	489, 490, 546
(Grimes)	249
woolen-rag mattresses, etc	536
Disinterment permits	18, 71, 158
(special)	31, 51, 65, 70, 85, 160
Domestic animals, contagious diseases of	30, 545
Dubuque, vaccination	96

	PAGE
Dust	247
Election of officers.....	45, 85
Elma, smallpox	107
Elkader, water.....	213
Embalmers	40, 49
department	145
Emmert, Dr. J. M.	24
Epileptics, State care for (Powell).....	446
Erysipelas	178
Exira, smallpox.....	98
Financial	12, 25, 32, 42, 51, 65, 82, 88
Firearms, sale of to minors.....	570
Food, its functions.....	281
preservatives.....	220
Foods, animal and vegetable compared.....	347
Formaldehyde	492
Funeral directors.....	49
Further legislation.....	225
Christian science.....	237
linseed oil inspection.....	243
marriages.....	226
medicine, practice of.....	227
osteopathy, practice of	230
personnel of Board of Health.....	225
petroleum products.....	240
salary of Secretary.....	226
unconstitutional, medical practice act.....	228
Gamble, Judge.....	228
Gasoline	531
its dangers	535
Geers, Dr. John G.....	119
Genoa (smallpox)	125
Gibson, Dr. James I.....	12, 28, 30, 36, 56, 86
Gifford, G. M.....	213
Gilchrist, Dr. James G.....	442
Gilman, Dr. H. A.	456
Glanders	36, 179
Gleason, Dr. G. W.....	97, 98
Goltre	181
Gonorrhoea	181
Goodrell, W. H. (deceased).....	11
Grimes, Dr. Eli	36, 45, 62, 244, 249
Grundy Center (water)	214
Guilbert, Dr. E. A.	11, 16, 23, 24, 25, 31, 32, 36, 39, 50, 51, 54, 60, 61, 62, 63, 64, 72, 75, 86, 406, 429
Hamburg (smallpox).....	91, 100, 102, 104
Hanna, W. H.	97
Hatfield, Dr. G. E.....	122

	PAGE
Health literature	223
officer	560
money value of (Gilchrist)	442
Hints on rural school grounds (Bailey)	262
House disinfection	249
Hubbell, Dr. N. S.	111, 116
Hurty, Dr. J. N.	72, 402
Infectious diseases	86
Influenza	182
Insane, better care for chronic (Gilman)	456
Insects	248
Iowa City (smallpox)	110
water	214
Isolation	244
Johnson, Dr. G. A.	392
Kegel, Dr. Ernest L.	215
Kellogg, Dr. C. F.	213
Kennedy, Dr. J. F.	16, 45, 75, 142, 410
Kepler, Dr. L. S.	115
Kerosene oil	523
and gasoline	531
Kerwin, M. F.	97
Kimballton (smallpox)	98
Lacona (smallpox)	122
La grippe	182
Lamp burners	534
Lamps	538
Law, Prof. James	371
Laws relating to public health and safety	553
adulteration of linseed oil	568
diseased animals	549
impure oil in coal mines	567
inspection of petroleum product	565
miscellaneous	569
practice of medicine	568
practice of osteopathy	581
practice of pharmacy	581
State Board of Health	554
State veterinary surgeon	548
Le Claire	119
Leprosy	36, 50, 142, 182, 486
Library	50
Linseed oil	50, 85, 248, 531
Lintine	74
Lloyd, Dr. Frederick	214
Local boards of health, regulations	498
Lumm, Dr. Dwight	101
Macy, Prof. S. R.	45, 216
Malaria	246

	PAGE
Mallien in glanders.....	12
Matthey, Dr. Henry.....	35, 60, 86, 120, 433
Mattresses, rugs, etc.....	60, 62 536
McBride, Prof. Thomas H.....	254
McKlveen, Dr. J. A.....	28, 35, 62, 70, 98, 103, 105, 121, 122, 124, 433
Measles.....	40, 183, 247, 484, 497
Meats, composition and cooking (Woods)	347
of	349, 364
cooking of.....	358
cuts of.....	362
digestibility of	357
flavor of.....	356
fuel value of.....	364
structure of	348
toughness of.....	355
Mechanicsville (smallpox).....	99, 100, 111
Meetings, State Board of Health.....	11, 15, 17, 28, 35, 36, 46, 51, 67, 70, 84
Members State Board of Health.....	5
Memorials.....	55, 59, 86
Middleton, Dr. W. D.....	29
Milk.....	244
aerating	338
and bacteria.....	317
as food (True).....	280
care of on the farm (Pearson).....	316
composition	282
cooling of.....	340
digestibility.....	286
diseased animals and persons.....	323
hauling to factory.....	343
how it becomes impure.....	323
to keep it pure.....	329
its relation to the health of children (Shrader)	276
nutritive value of.....	285, 291, 295
skimmed	288, 343
use of with other foods	293, 293
variations in.....	284
Milo (smallpox).....	122
Miners' oil.....	29, 38, 529
law relating thereto.....	567
Miners, provision for their safety	571
Montezuma	24
Mount Vernon	113
Mumps	183, 235
National Pure Food and Drug Congress.....	70, 75
National Quarantine Convention	67, 69
Nebraska City, Neb. (smallpox).....	91, 92, 103
Nuisances, abating.....	64, 502, 514, 515
Officers elected.....	45, 85

	PAGE
Oil districts.....	29
Oil inspector, deputy, E. A. Ballard.....	11
Oil, linseed.....	50, 85, 86
law relating thereto.....	568
Oil, miners'	29, 38
Oils, illuminating and linseed.....	50, 60, 523
Opium smoking.....	569
Ordinance for cities and towns.....	505
townships	515
Orleans township, Winneshiek county (smallpox).....	125
Osteopathy, law relating thereto	561
Otter township, Warren county (smallpox).....	122
Oxford Junction (water).....	214
Parkhurst, J. C.....	100
Parks, public for Iowa towns (McBride).....	254
Pearson, R. A.....	316
Petroleum products, law.....	565
Percival (smallpox).....	101, 103, 104
Pharmacy, law relating thereto.....	561
Physician, position in tuberculosis	402
Plague, bubonic.....	165
Pneumonia.....	184
Powell, Dr. F. M.	446
Preston, Dr. C. H.....	120, 121
Price, Dr. B. F.....	122
Prosecutions	505
Public health, laws relating thereto	554
adulteration of linseed oil	568
Board of Health.....	554
diseased animals	549
impure oil in coal mines.....	567
inspection of petroleum products.....	565
miscellaneous	569
Practice of medicine.....	558
Practice of Osteopathy	561
Practice of pharmacy.....	561
veterinary surgeon	548
Public parks for Iowa towns.....	254
Public schools, contagious diseases in.....	495
Puerperal fever.....	184, 486
Pulmonary consumption, ventilation and outdoor life in (Guilbert).....	406
Quarantine.....	11, 74, 506, 480, 516, 546
Rabies	185
Rag mattresses, disinfection of.....	60, 62
Railroad accidents.....	197, 572
Rawson, Dr. A. A.....	218
Relapsing fever.....	186
Remley, Milton, Attorney-General	16, 94, 240
Riley, Dr. John	98
Robb, W. E.....	192
Rome (smallpox).....	105

	PAGE
Rotheln (German measles).....	187, 497
Rural school grounds, hints on (Bailey).....	262
Russell, Dr. Scott	116
Sanitary bacteriology (Grimes)	244
Sanitation, evolution of, in Iowa (Guilbert).....	429
Scarlet fever.....	187, 247, 483
Schaller, Phil	61
Scroggs, Dr. J. A.	46, 49, 50, 62, 87
School desks (Woods) ...	434
grounds, hints on (Bailey).....	262
Schools	504, 521
Sewage	248
disposal of on the farm (Smith).....	461
liquid.....	469
kitchen and chamber slops.....	472
night soil	464
protection of drinking water.....	474
waste and garbage.....	473
Shrader, Dr. J. C.	12, 46, 56, 84, 87, 93, 106, 110, 111, 112, 113, 123, 276
Shenandoah (water)	214
Slamberg, Dr. L.....	98
Slaughter houses	512, 522
Slee, Dr. Richard.....	130
Smallpox	70, 71, 87, 188 247, 482
in Iowa, Appanoose county.....	97
Audubon county.....	99
Cedar county.....	99
Fremont county.....	100
Henry county.....	105
Howard county.....	106
Johnson county.....	110
Jones county.....	111
Lee county.....	119
Scott county.....	119
Shelby county.....	121
Warren county.....	122
Washington county.....	123
Wayne county.....	124
Winneshiek county.....	125
Smith, Dr. Theobald.....	461
Standing committees.....	46, 88
State Board of Health, law relating thereto.....	554
Bacteriologist	45
Chemist	45
members.....	5
Secretary.....	3
Medical examiners, law relating thereto.....	558
Veterinary Surgeon, law regulating	548
Storm Lake (water)	215
Sulphur fumes, disinfection.....	492

	PAGE
Sunshine.....	245
Syphilis	189
Tetanus (lock jaw).....	189
Thomas, Dr. M. L.....	104
Tobacco, sale of to minors.....	510
Torpey, Dr. J. F.	107
Towne, Dr. D. R.	91
Township boards, rules and regulations.....	30, 515
Transit permits.....	54, 150
Trichinosis	189
True, A. C.	280
Tuberculin	12, 380, 386, 389
Tuberculosis.....	12, 23, 30, 46, 190, 236, 244, 486
bovine, its relation to human tuberculosis (Johnson).....	392
hygienic treatment of (Kennedy).....	410
in cattle and its control (Law).....	371
information respecting (Shrader).....	538
ventilation and out door life in (Gullbert).....	406
Typhoid fever.....	191, 246, 484, 498
Typhus	192
Vaccination	127
Vaccine virus, modern methods in production (Slee).....	130
Vandervaat, S.....	211
Vansyoc, R. E.	122
Vital statistics	24, 39, 72, 73, 202
Walcott (water).....	215
Waring, Col. G. E.....	23
Water pollution	25, 59, 216, 248
supplies (public), Cedar Falls.....	210
Centerville	211
Clinton	211
Corning	213
Elkader.....	213
Grundy Center.....	214
Iowa City.....	214
Oxford Junction.....	214
Shenandoah	214
Storm Lake.....	215
Walcott	215
protection of drinking (Smith).....	461
Wellman (smallpox)	123
West Point.....	119
Whooping cough.....	40, 193, 484, 498
Wilkinson, H. E.....	97
Williams, Dr. D. E.,	113
Woodbridge, Prof. S. H., "Car Sanitation".....	21
Woodbury, Dr. A. C.....	215
Woods, Charles D.....	347
Woods, Dr. Hiram, Jr.....	434
Yellow fever.....	21, 23, 73, 193

EIGHTH BIENNIAL REPORT

OF THE

Bureau of Labor Statistics

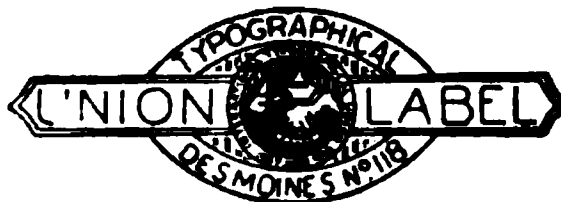
FOR THE

STATE OF IOWA.

1897-98.

W. E. O'BLENESS, Commissioner.

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1898.

LETTER OF TRANSMITTAL.

OFFICE OF COMMISSIONER OF LABOR STATISTICS, {
DES MOINES, Iowa, October 2, 1899. }

Hon. Leslie M. Shaw, Governor of Iowa:

SIR—In compliance with the law creating this office, I have the honor to herewith transmit to you the eighth biennial report of this department. Very respectfully,

W. E. O'BLENESS,
Commissioner.

INTRODUCTORY.

In the report of the BUREAU OF LABOR STATISTICS for the years 1894 and 1895 some very strong recommendations were made for a new law governing the office; a law that would enable the commissioner to disseminate information and facts, not estimates. The Twenty-sixth General Assembly took the matter under consideration, and, after long and thorough investigation, brought about the following law:

CHAPTER 8.

OF THE BUREAU OF LABOR STATISTICS.

Section 2469. Commissioner. The bureau of labor statistics shall be under the control of a commissioner, biennially appointed by the governor by and with the advice and consent of the executive council, whose term of office shall commence on the first day of April in each even-numbered year and continue for two years, and until his successor is appointed and qualified. He may be removed for cause by the governor, with the advice of the executive council, record thereof being made in his office; any vacancy shall be filled in the same manner as the original appointment. He shall give bonds in the sum of \$2,000 with sureties to be approved by the governor, conditioned for the faithful discharge of the duties of his office, and take the oath prescribed by law. He shall have an office in the capitol, safely keep all records, papers, documents, correspondence, and other property pertaining to or coming into his hands by virtue of his office, and deliver the same to his successor, except as hereinafter provided.

Section 2470. Duties—report. The duties of said commissioner shall be to collect, assort, systematize, and present in biennial reports to the governor statistical details relating to all departments of labor in the state, especially in its relations to the commercial, social, educational and sanitary conditions of the laboring classes, and to the permanent prosperity of the mechanical, manufacturing and productive industries of the state, and he shall as fully as practicable collect such information and reliable reports from each county in the state, the amount and condition of the mechanical and manufacturing interests, the value and location of the various manufacturing and coal productions of the state, also sites offering natural or acquired advantages for the profitable location and operation of different branches of industry; he shall by correspondence with interested parties in other parts of the United States, impart to them such information as may tend to induce the location of mechanical and producing plants within the state, together with such

other information as shall tend to increase the productions, and consequent employment of producers; and in said biennial report he shall give a statement of the business of the bureau since the last regular report, and shall compile and publish therein such information as may be considered of value to the industrial interests of the state, the number of laborers and mechanics employed, the number of apprentices in each trade, with the nativity of such laborers, mechanics' and apprentices' wages earned, the savings from the same, with age and sex of laborers employed, the number and character of accidents, the sanitary condition of institutions where labor is employed, the restrictions, if any, which are put upon apprentices when indentured, the proportion of married laborers and mechanics who live in rented houses, with the average annual rental and the value of property owned by laborers and mechanics; and he shall include in such report what progress has been made with schools now in operation for the instruction of students in the mechanic arts and what systems have been found most practical, with details thereof. Such report shall not contain more than 600 printed pages, and shall be of the number, and distributed in the manner, provided by law.

Section 2471. Power to secure evidence. The commissioner of the bureau of labor statistics shall have the power to issue subpoenas, administer oaths, and take testimony in all matters relating to the duties herein required by said bureau, said testimony to be taken in some suitable place in the vicinity to which testimony is applicable. Witnesses subpoenaed and testifying before the commissioner of the bureau shall be paid the same fees as witnesses before a justice court, such payment to be made out of the contingent fund of the bureau in advance, but such expenses for witnesses shall not exceed \$100 annually. Any person duly subpoenaed under the provisions of this section, who shall wilfully neglect or refuse to attend or testify at the time and place named in the subpoena shall be deemed guilty of a misdemeanor, and upon conviction thereof, before any court of competent jurisdiction shall be punished by a fine not exceeding \$50 and costs of prosecution, or by imprisonment in the county jail not exceeding thirty days; provided, however, that no witness shall be compelled to go outside the county in which he resides to testify.

Section 2472. Right to enter premises. The commissioner of the bureau of labor statistics shall have the power, upon the complaint of two or more persons, or upon his failure to otherwise obtain information in accordance with the provisions of this act, to enter any factory or mill, workshop, mine, store, business house, public or private work, when the same is open or in operation, upon a request being made in writing, for the purpose of gathering facts and statistics such as are contemplated by this act, and to examine into the methods of protection from danger to employes, and the sanitary conditions in and around such buildings and places, and make a record thereof; and any owner or occupant of such factory or mill, workshop, mine, store, business house, public or private work, or any agent or employe of such owner or occupant who shall refuse to allow any officer or employe of said bureau to so enter, or who shall hinder him, or in any way deter him from collecting information, shall be deemed guilty of a misdemeanor, and upon conviction thereof, before any court of competent jurisdiction, shall be punished by a fine of not exceeding \$100 and costs of prosecution, or by imprisonment in the county jail not exceeding thirty days.

Section 2473. Meaning of terms. The expression, "factory," "mill," "workshop," "mine," "store," "business house" and "public or private work," as used in this act, shall be construed to mean any factory, mill, workshop, mine, store, business house, public or private work, where five or more wage-earners are employed for a certain stipulated compensation.

Section 2474. Reports of bureau. It shall be the duty of every owner, operator or manager of every factory, mill, workshop, mine, store, business house, public or private work, or any other establishment where labor is employed as herein provided, to make to the bureau, upon blanks furnished by said bureau, such reports and returns as said bureau may require for the purpose of compiling such labor statistics as are contemplated in this act; and the owner, operator or business manager shall make such reports or returns within sixty days from the receipt of blanks furnished by the commissioner, and shall certify under oath to the correctness of the same. Any owner, operator or manager of such factory, mill, workshop, mine, store, business house, public or private work, as herein stated, who shall neglect or refuse to furnish to the commissioner of labor such reports or returns as may be required by the following blank, shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine not exceeding \$100 and costs of prosecution, or imprisoned in the county jail not exceeding thirty days.

BLANK.

Name of firm or corporation..... Number of hands employed during year ending December 31,, males....., females....., apprentices..... Total amount of wages paid during year ending December 31,, \$..... Total amount of wages paid previous year, \$..... Any general increase or reduction of wages during the past year? If so, what per cent of increase or reduction?..... Cause of increase or reduction..... Any increase or decrease of business during past year?..... What means are provided for the escape of employes in case of fire?..... What measures are taken to prevent accident to employes from machinery?..... How are buildings ventilated?..... Are separate water-closets and wash-rooms provided for the different sexes?..... Number of weeks during past year business was run on full time with full force..... Number of weeks during past year business was run on short time or with reduced force..... Number of weeks during past year business was suspended..... Number of strikes during year ending December 31,,, number involved....., alleged cause....., result..... How many days did strike continue, and what was loss of wages in consequence thereof?..... Was any property destroyed, and, if so, its value?.....

Section 2475. Use of information. In the reports of the commissioner no use shall be made of names of individuals, firms or corporations supplying the information called for by sections 2470 and 2471 of this act, such information being deemed confidential and not for the purpose of disclosing personal affairs, and any officer or employe of the bureau of labor statistics violating this provision shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be fined in a sum not exceeding \$500 and costs of prosecution, or by imprisonment in the county jail not exceeding one year.

Section 2476. Reports and records preserved. No report or return made to said bureau in accordance with the provisions of this chapter, and no schedule, record or document gathered or returned by its officers or employes shall be destroyed within two years of the collection or receipt thereof. At the expiration of two years, all records, schedules or papers accumulating in said bureau during said period that may be considered of no value by the commissioner may be destroyed, provided the authority of the executive council be first obtained for such destruction.

Section 2477. Compensation and expenses. Said commissioner shall receive a salary of \$1,500 per annum, and shall be allowed a deputy at a salary of \$1,000 per annum in lieu of clerk hire, payable monthly, and necessary postage, stationery and office expenses, the said salary and expenses to be paid by the state as the salaries and expenses of other state officers are provided for. The commissioner, or any officer or employe of the bureau of labor statistics, shall be allowed in addition to their salaries their actual and necessary traveling expenses while in the performance of their duties; said expenses to be audited by the executive council and paid out of the general fund of the state upon a voucher verified by the commissioner, provided that the total of such expenses for officers and employes shall not exceed \$500 per annum.

By a careful reading of section 2470 of the above law, it will readily be seen that to follow out strictly the letter of the law it would take an appropriation of at least \$20,000 a year, and to keep constantly in the field not less than ten men. This section simply amounts to a complete census for the state each year. It is simply an impossibility for the bureau as it now exists to carry out, or attempt to carry out, what is contemplated by this section. Rather than this, the general assembly ought to designate some subject, or set of subjects to be investigated in each biennial period. By this method the bureau will have but the one object in view and can thus prosecute it to the fullest extent, and arrive at a conclusion that will be justifiable in the expenditure of this money by the state.

Section 2471 provides that the commissioner shall have the power to issue subpoenas, administer oaths and take testimony in all matters relating to the duties herein declared by said bureau, said testimony to be taken in some suitable place in the vicinity of which such testimony is applicable. Witnesses subpoenaed and testifying before the commissioner shall be paid the same fees as witnesses before a justice court, such payment to be made out of the contingent fund of the bureau in advance. This is not in any way applicable from the fact that there is no such thing as a contingent fund connected in any way with the bureau. A contingent fund ought to be provided for or the law be so amended as to not permit testimony.

Section 2474 gives all persons, firms or corporations employing five or more in the state a right of sixty days in which to report to the bureau after receiving the blanks herein provided. This is too long a time, there being no necessity for more than twenty days in any case. Many institutions who desire to report, knowing that they have sixty days in which to do so, file their blank until some time when they perhaps may have more leisure, and thus forget it entirely or until they are reminded of the fact that they are past due.

In the questions provided by section 2474 there ought to be some method adopted whereby the amount of wages reported could be distinguished so as to show the amount that male help receive, and the amount that female help receive, and the amount paid to apprentices. As it is now reported there is no distinction made in any case.

RECOMMENDATIONS.

The reports of the bureau of labor statistics are published biennially. These reports are valuable to the student and doctrinaire, who out of past conditions desire to spin theories to govern future actions, but to the man dependent upon his daily labor for his daily bread, a knowledge of what the condition of the laboring people was two years ago sinks into insignificance compared with a knowledge of how he can better his own condition now. The length of time which necessarily elapses between the completion of much of the work and the publication of the report greatly diminishes its practical value to those for whose main benefit the office was established. Labor statistics, in order to be of real value to laboring people, must be up to date and published at frequent intervals. Therefore, your commissioner recommends that a bulletin, such as the national bureau and the Massachusetts bureau and other states are now publishing, be published by this bureau quarterly.

GUARDS AND BOILER INSPECTION.

There are a few persons and corporations employing men who have no railing or guards around dangerous machinery, fly wheels and vats. There are a large number of steam boilers being fired by incompetent boys and men. Numerous requests have come to this office asking that these matters be looked into and regulated. Nothing could be done by this office further than to advise and suggest, from the fact that there is no law on the statute books of Iowa regulating the same. There should be a law compelling employers to box or cover all dangerous machinery and shafting, place railings around fly wheels and vats, and there should be some person vested with the power to enforce the same. There ought to be some person whose duty it should be to see to it that no one would be allowed to fire a steam boiler who could not stand a competent examination. Many lives are in constant danger from incompetent handling of steam boilers. Accidents happen in the best

regulated institutions, and the utmost care should be exercised to throw about employes all the safety appliances possible. A very large per cent of the institutions in the state employing labor are very careful in this respect, having in vogue every safety appliance possible, besides the strictest orders to their employes to be careful. This is as it should be. For the few who do not seem to care anything about the safety of their employes, your commissioner makes the above recommendations.

CO-OPERATIVE RAILROADING.

The plan adopted four years ago of assisting those in the employ of the Illinois Central Railroad company in buying, through partial payments, one share at a time, of the capital stock, has resulted in (1897) 399 officers and employes (other than the board of directors) now owning 1,969 shares, and in 1,624 having made partial payments on account of the further purchase of one share apiece. The sum held by the company for partial payments on such purchases amounted at the close of the year to \$54,794.38, representing an average payment of \$33.74 on each share. Previous to the adoption of this plan, few if any of the company's shares were owned by those living on or near the railroad elsewhere than in Chicago, Cairo and New Orleans. The purchases by employes have led to buying by others living on the line, and at present there are registered on the company's books residents of every state and of almost every county served by the railroad. In order to insure a large attendance of stockholders at the regular meeting thereof the directors of the road issue free transportation to and from Chicago to all persons holding stock, wherever located.

One year later, June 30, 1898, the number of officers and employes (other than directors) of the corporation registered on the books of the company as stockholders has increased to 733, and their holdings amount to 2,536 shares. The stock is being gradually purchased by those resident on or near the line. In each of the ten states in which the company is operating railways there are a number of stockholders, varying from 4 in Indiana to 732 in Illinois. The total number of stockholders in these ten states is 1,115, and the number of shares held by them 23,630. There are resident in the United States 3,365 stockholders, owning 273,709 shares; in Great Britain 2,896, owning 229,252 shares; elsewhere 120, owning 57,983 shares.

Exclusive of one large block of shares, held for more than thirty years in trust by a Dutch syndicate or administration office against its own certificates, good to bearer, which are

widely scattered among hundreds of owners, the average holding of the remaining proprietors registered on the books of the company is less than $75\frac{1}{2}$ shares. In the United States the average is little over $70\frac{1}{2}$ shares. All told, the books show 8 holdings of 5,000 shares or over; 51 of 1,000 shares or over; 80 of 500 shares or over; 681 of less than 500 but more than 100 shares; 391 of exactly 100 shares each, and 5,170 of less than 100 shares. The number of stockholders registered on the books of the company is 6,381. Barely one-eighth of them own 100 shares apiece.

On the first day of each month the company quotes to employes, through the heads of their department, a price at which their applications will be accepted for the purchase of Illinois Central shares during that month. An employe is offered the privilege of subscribing for one share at a time, payable by installments in sums of \$5, or any multiple of \$5, on the completion of which the company will deliver to him a certificate of the share registered in his name on the books of the company. He can then, if he wishes, begin the purchase of another share on the installment plan. The certificate of stock is transferable on the company's books, and entitles the owner to such dividends as may be declared by the board of directors, and to a vote in their election.

Any officer or employe making payments on this plan will be entitled to receive interest on his deposits, at the rate of 4 per cent per annum, during the time he is paying for his share of stock, provided he does not allow twelve consecutive months to elapse without making any payment, at the expiration of which period interest will cease to accrue, and the sum at his credit will be returned to him on his application therefor.

Any officer or employe making payments on the foregoing plan, and for any reason desiring to discontinue them, can have his money returned to him with accrued interest, by making application to the head of the department in which he is employed.

An employe, who has made application for a share of stock on the installment plan, is expected to make the first payment from the first wages which may be due him. Forms are provided for the purpose, on which the subscribing employe authorizes the local treasurer in Chicago, or the local treasurer in New Orleans, or the paymaster or the assistant paymaster to

retain from his wages the amount of installment to be credited monthly to the employe for the purchase of a share of stock.

In case an employe leaves the service of the company from any cause, he must then either pay in full for the share for which he has subscribed and received a certificate therefor, or take his money with the interest which has accrued.

The foregoing does not preclude the purchase of shares of stock for cash. An employe who has not already an outstanding application for a share of stock on the installment plan, which is not fully paid for, can in any given month make application for a share of stock for cash at the price quoted to employes for that month, and he can in the same month, if he so desires, make application for another share on the installment plan.

Employes who want to purchase more than one share at a time for cash must address the vice-president in Chicago, who will obtain for them from the New York office a price at which the stock can be purchased.

Any employe desiring to purchase stock (except in special purchase of more than one share for cash) must apply to his immediate superior officer, or to one of the local treasurers, or to the traveling agent.

The system tends to bring the employer and the employes in closer affiliation. It also gives those employed in the service a direct, personal interest in the profits and in the control of the corporation; affords them a safe investment at a fair rate of interest for their savings when deposited in very small sums. This replaces, to a certain extent, the lack of savings banks, which do not exist in the rural districts in the south and west as they do in New York and New England.

To the corporation, the advantage lies in having a resident ownership of stock, and that ownership in the hands of those upon whom it must always rely for the safe and economical despatch of its business.

That the public in the territory served by the railroads named above will benefit by this, goes without saying.

MANUAL TRAINING SCHOOLS.

The law regulating the office of the commissioner of labor statistics requires that the commissioner shall include in his report what progress has been made with the schools row in

operation for the instruction of students in the mechanic arts, and what systems have been found most practical thereof.

So far as known, there are but two cities in the state where manual training is taught, namely, West Des Moines and Mason City. Following will be found extracts from the report of Mr. A. C. Newell, instructor in the West Des Moines schools:

No radical changes have taken place in the manual training department of the West Des Moines schools in the last two years, but the facilities for teaching have been considerably increased, consequently more and better work has been accomplished. Two years ago eighteen new benches were purchased at an expense of about \$125. New tools to the value of \$50 were added to the equipment of the department. This was done to enable the instructor to handle larger classes.

Manual training in the West Des Moines schools is an elective subject, and is usually taken the first two years of the course. In the high school the work is arranged as follows:

FIRST YEAR'S WORK.

Mechanical drawing, 45 minutes per day. This course consists in the use of instruments in making simple geometric and working drawings; the study of orthographic projections, and practice in making drawings showing the intersection and development of the surfaces of objects. The pupils are taught to make simple letters and figures, and a title plate in which several styles of letters are used is also required.

Wood joinery, 45 minutes per day. The object of this course is to teach the use of tools. Part of the exercises used are given for practice, and are followed by constructed objects which are complete and useful articles when finished.

SECOND YEAR'S WORK.

Mechanical drawing, 45 minutes per day; machine design; tracing and blue print making; isometric and oblique projection.

Wood carving, 45 minutes per day for six months (following carving); exercises in center turning. In these exercises the pupils are taught the correct methods of using the common carving tools; inside and outside turning on the face plate; turning of goblets, spheres, towel rings, napkin rings, plates, boxes, etc.; constructed exercise from design, as a stool, stand or table; use of oils, stains, shellac and varnish in finishing woods; inlaying on the face plate; exercises in gluing and turning glued pieces; study of the growth of timber, and the use and strength of different kinds of wood.

THIRD YEAR'S WORK.

Mechanical drawing, 45 minutes per day; shades and shadows of objects drawn in orthographic projection; perspective; drawing of objects in parallel and oblique perspective; shades and shadows of objects drawn in perspective; intersection of surfaces; drawing of buildings in perspective; use of water colors.

The number of pupils taking manual training is increasing, and the pupils and patrons of the high school more fully appreciate the value of the

BUSINESS OFFICE KENYON PRINTING & MFG. CO., DES MOINES.

department each year. At the present time pupils must choose between manual training and Latin the first year, and persons choosing to have four years of Latin must take that subject as soon as they enter the high school. Quite a number of pupils have asked to take both manual training and Latin during their freshman year, and leave one of the other first studies until later in the course. This has not been allowed in the past, but it is hoped may be arranged for in the future. Such a plan would be appreciated by quite a number of pupils, and probably would considerably increase the enrollment in the manual training department. The greatest objection to such an arrangement is that it is feared that it would complicate the program.

Most of the pupils taking industrial training come to the manual training teacher twice a day, once for drawing and once for wood work, there being a total enrollment of ninety-six.

The "Sloyd" or manual training for the grades, which was introduced three years ago, has proved to be much more of a success during the past year than ever before, and the results of the work are encouraging.

The manual training movement is comparatively new, and it has had to fight against all the forces of conservatism among educators, and also to show the thinking taxpayers that it belongs in the schools as a branch of education. The fact that it has safely run the gauntlet of opposition and criticism is a pretty sure guarantee of its excellence. The parents of pupils who have taken manual training speak enthusiastically in its praise and say that it tends to make better citizens. It tends to give a broader education and so will make better physicians, better clergymen, better lawyers, better teachers, better and more intelligent artisans, and more capable and generous employers.

We are living in an age of great industrial activity. Between the years of 1850 and 1880 our manufactured products increased in value 550 per cent, and the number of persons employed increased 325 per cent. Most of the articles for household use that were once made at home by members of the family are now made in large factories, and as a result of this the children miss the valuable training at home that they once had. If children are not taught to work with their hands while they are young they are apt to have a false idea of the value and dignity of manual labor. The manual training schools of the present day naturally aid in preparing the boys and girls for the busy industrial life they are soon to enter. Quite a number of girls take the manual training work each year. Mental training is obtained by teaching the hand and eye to do that which the brain directs, just as mental training is obtained by developing the memory and reasoning powers by the study of history and mathematics. Manual training is valuable to the girls for many reasons. Probably the most noticeable effect is that it makes them much more reliant.

During school hours classes from the high school have occupied most of the time; and since the "Sloyd" system was introduced into the grades considerable time has been given after school hours, four times a week, to this work.

MANUAL TRAINING AT MASON CITY.

The manual training department in the public schools at Mason City continues to grow in favor with the pupils and the public. There were enrolled 150 boys, from the seventh to the twelfth grades.

The department has been strengthened by improving the architectural and mechanical drawing. The equipment has been greatly enhanced by the introduction of a machine saw, turning lathe and electric motor.

The boys grow to be accurate, independent and thoughtful. Accurate drawings of all constructive work are made before any exercise is made in wood. The boys learn to read and appreciate the value of working-drawings. The aim is to make the work strictly educational, and the skill in drawing and use of tools merely incidental.

The precision, planning and independent execution become a part of every school exercise. Teachers of other parts of the school work comment on the increased power and independence of the boys in preparation of the regular lessons of the school.

LABOR ORGANIZATIONS.

During the extremely hard times the past few years the labor organizations throughout the state suffered to a very great extent, both from a numerical and financial standpoint. Some found it necessary to absolutely disband, others to curtail expenses in various ways and to amend their laws to the existing conditions. The past year has shown that they have come out of the fire with almost all of the dross swept away, and to-day are stronger and better than ever.

There are more and better organizations in the state now than ever before. Better judgment and care is being administered in the laws by which they are governed. They are more anxious than ever that all difficulties shall be settled by any other means than the strike.

Almost every person belonging to a laboring organization regrets very much to resort to the very last possible means to settle a grievance or misunderstanding—the strike. In the selection of committees to handle all grievances and difficulties more care is taken than ever before.

In three cities of the state steps are being taken by which the labor organizations hope in the near future to build and own their hall, equipped with all modern improvements, including gymnasium, baths, library and reading rooms, and to make the place one of constant enjoyment and pride to their membership. This it is believed will add very materially to their enrollment and be a source of instruction and enlightenment to all laboring people who may care to take advantage of it.

According to press reports, Labor day the past year was more generally observed than in any previous year since its inauguration. This is as it should be, and every person who labors should make an extra effort to make this day what its name implies—Labor's day.

REPORTS BY COUNTIES.

In the following tables there will be found the reports by counties of the various individuals, companies, firms and corporations, who employ five or more persons, as required by law. It will be noticed that there is a wide difference in the number reporting in the various years, but this is accounted for by some institutions going out of business, some being reorganized and new books opened, and the records of previous years not being available, it was impossible to secure a report; and again new firms and individuals began business in one year and did not do business the year previous, therefore, could not report for the one year; then again, firms that report for the one year refuse or neglect to report the next; and *vice versa*, and for various other reasons too numerous to mention.

In the recapitulation for the entire state will be found a comparison of the years 1896, 1897 and 1898, which shows that there were in 1896, 1,752 firms reporting, in 1897, 1,311 and in 1898, 1,625. There were in 1896, 40,854 men, 7,732 women and 687 apprentices; in 1897, 40,127 men, 7,696 women and 532 apprentices; in 1898, 45,006 men, 9,800 women and 623 apprentices. Wages paid out in 1896, were \$17,369,622; in 1897, \$17,656,724; in 1898, \$19,623,892. The average time employed during the year 1896, forty weeks full time with full force, eight weeks short time with reduced force, and four weeks suspended. In 1897, forty-four weeks full time with full force, five weeks short time with reduced force, and three weeks suspended. In 1898, forty-five weeks full time with full force, four weeks reduced force, and three weeks suspended.

It will be readily understood that this is but a partial report of the business of Iowa institutions, as none but those who employ five or more persons are included herein. There are thousands of institutions in the state that employ less than five, of which this office can make no record whatever. The law ought to be amended so as to read, three or more, therefore making a much more comprehensive showing for the state, or better still, all

persons, firms and corporations employing one or more ought to report, thus giving a complete census of the employing public every year. It would cost the state but little more than it does now, as all the places where labor is employed must be visited anyway each year. It would be but little more work to get all the places than it is to hunt out none but those who employ five or more. There are objections to the law as it now exists, from the fact that those reporting say that all persons or firms who employ labor ought to report.

[illegible]

BOONE COUNTY.

[illegible]

BREMER COUNTY.

[illegible]

BUCHANAN COUNTY.

[illegible]

EIGHTH BIENNIAL REPORT OF THE

BUENA VISTA COUNTY.

Line No.	KIND OF BUSINESS.	NO. EMPLOYED, 1897.		NO. EMPLOYED, 1898.		Amount of wages paid out in 1897.	Amount of wages paid out in 1898.	NO. WEEKS IN OPERATION, 1897.		NO. WEEKS IN OPERATION, 1898.	
		Males.	Females.	Males.	Females.			Full time, full force.	Short time, reduced force.	Full time, full force.	Short time, reduced force.
1	General merchandise.	2	1	13	2	\$ 5,093	\$ 5,250	53	53	53	53
2	Hotel.	2	1	2	1	1,793	1,793	53	53	53	53
3	Total.	4	2	15	3	6,886	7,043	106	106	106	106
4	Average.	2	1	7.5	1.5	3,443	3,521.5	53	53	53	53

CARROLL COUNTY.

1	Hotels.	2	2	10	16	\$ 5,027	\$ 4,835	53	53	53	53
2	Wholesale groceries.	1	1	9	1	11,850	11,850	53	53	53	53
3	Total.	3	3	19	17	16,877	16,685	106	106	106	106
4	Average.	1.5	1.5	9.5	8.5	8,438.5	8,342.5	53	53	53	53

CASS COUNTY.

CEDAR COUNTY.

1	Brick and tile.	1	2	9	9	\$ 1,400	\$ 1,550	24	24	24	24
2	Lime manufacturing.	1	12	115	115	4,333	4,333	40	40	40	40
3	Stone quarries.	1	1	1	1	45,000	45,000	25	25	25	25
4	Total.	3	15	125	125	46,733	46,883	89	89	89	89
5	Average.	1	5	31.25	31.25	15,577.66	15,627.66	22.25	22.25	22.25	22.25

ONERBO GORDO COUNTY.

CHEROKEE COUNTY.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Brick and tile	1	15	.....	25	.....	\$ 1,200	.....	\$ 1,167	.....	13	.....	40	.....	4	.....			
Hotels	2	3	.....	1	.....	1,300	.....	3,300	.....	58	.....	.....	.....	.....	.....
Total	3	17	.....	25	.....	.....	.....	4,467	.....	.....	.....	39	.....	8	.....			
Average				

OBIOKASAW COUNTY.

Hotel	1	1	2	7	3	7	\$ 1,554	62	544	62
Total	1	1	2	7	3	7	\$ 1,554	62	544	62
Average	1	1	2	7	3	7	\$ 1,554	62	544	62

CLARKE COUNTY.

1	Hotel	1	1	4	6	4	\$	2,400	\$	1,032	63	50
	Total	1	1	4	6	4						
	Average	1	1	4	6	4	\$	3,000	\$	1,032	63	50

CLAY COUNTY.

Grain, hay and live stock.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
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CLAYTON COUNTY.

Line No.	KIND OF BUSINESS.	NO. EMPLOYED, 1897.		NO. EMPLOYED, 1898.		NO. WEEKS IN OPERATION, 1897.		NO. WEEKS IN OPERATION, 1898.		Amount of wages paid out in 1897.	Amount of wages paid out in 1898.
		Males	Females	Males	Females	Full time, full force	Short time, reduced force.	Suspended.	Full time, full force.	Short time, reduced force.	Suspended.
4	Brick manufacturer.	8	7	10	6	32	14	22	32	14	22
5	"	7	6	6	4	34	14	22	34	14	22
6	"	126	2	125	4	36	16	6	36	16	6
7	umber.	146	2	141	2	37	7	13	37	7	13
8	Total.	181	15	191	18	139	51	61	139	51	61
9	Average.	181	15	191	18	139	51	61	139	51	61

CLINTON COUNTY.

Line No.	KIND OF BUSINESS.	NO. EMPLOYED, 1897.		NO. EMPLOYED, 1898.		NO. WEEKS IN OPERATION, 1897.		NO. WEEKS IN OPERATION, 1898.		Amount of wages paid out in 1897.	Amount of wages paid out in 1898.
		Males	Females	Males	Females	Full time, full force	Short time, reduced force.	Suspended.	Full time, full force.	Short time, reduced force.	Suspended.
1	Beer manufacturer.	10	4	11	5	52	1	1	52	1	1
2	Boilers and sheet iron.	30	1	20	1	52	1	1	52	1	1
3	Box, crate and shuck manufactories.	108	1	155	1	48	4	1	48	4	1
4	Clothing, shoes and turpinalags.	14	2	14	2	52	1	1	52	1	1
5	Coal, wood and ice.	11	1	6	1	52	1	1	52	1	1
6	Confectionery and ice cream.	17	2	16	2	52	1	1	52	1	1
7	Crackers and cakes.	17	2	16	2	52	1	1	52	1	1
8	Dry goods and carpets.	22	3	25	3	46	1	1	46	1	1
9	Foundry and machine works.	31	4	156	5	52	1	1	52	1	1
10	Furniture manufactories.	144	1	199	1	40	10	2	40	10	2
11	Gas and electric light.	20	1	24	1	52	1	1	52	1	1
12	General merchandises.	5	2	13	2	52	1	1	52	1	1
13	Harness and neckyoke manufactory.	23	1	20	1	52	1	1	52	1	1
14	Hotels.	15	21	14	21	44	13	1	44	13	1
15	Kindling wood factory.	15	3	12	3	52	1	1	52	1	1
16	Laundry.	16	1	15	1	52	1	1	52	1	1
17	Lumber, sash, doors and blinds.	1,225	2	1,243	3	31	9	9	31	9	9
18	Merchant tailors.	1	1	6	1	10	1	1	10	1	1
19	Metal cornice factory.	7	3	5	3	25	2	1	25	2	1
20	Millinery.	6	1	13	1	25	4	1	25	4	1
21	Milling and grain.	34	13	23	14	52	1	1	52	1	1
22	Newspaper, printing and binding.	10	4	17	3	52	1	1	52	1	1
23	Paper manufactory.	10	4	17	3	52	1	1	52	1	1
24	Street railway.	20	1	20	1	52	1	1	52	1	1

EIGHTH BIENNIAL REPORT OF THE

DES MOINES COUNTY.

Line No.	Kind of business.	No. employed, 1897.				No. employed, 1898.				No. reporting, 1897.	No. reporting, 1898.	No. weeks in operation, 1897.				No. weeks in operation, 1898.			
		Males.	Females.	Apprentices.		Males.	Females.	Apprentices.				Bull time, full force.	Short time, reduced force.	Suspended.	Bull time, full force.	Short time, reduced force.	Suspended.		
1	Barrel manufactory.....	1				40	40			\$ 2,548	\$	18,584	10	45		40	6	6	
2	Brick manufactories.....	40	10			8	11			8,000		18,584	10	45		40	6	6	
3	Brick manufactories.....	40	10			8	11			1,500		18,584	10	45		40	6	6	
4	Brick manufactories.....	40	10			8	11			10,736		18,584	10	45		40	6	6	
5	Brick manufactories.....	40	10			8	11			6,000		18,584	10	45		40	6	6	
6	Brick manufactories.....	40	10			8	11			28,365		18,584	10	45		40	6	6	
7	Brick manufactories.....	40	10			8	11			7,000		18,584	10	45		40	6	6	
8	Brick manufactories.....	40	10			8	11			10,600		18,584	10	45		40	6	6	
9	Brick manufactories.....	40	10			8	11			20,500		18,584	10	45		40	6	6	
10	Brick manufactories.....	40	10			8	11			20,000		18,584	10	45		40	6	6	
11	Brick manufactories.....	40	10			8	11			18,186		18,584	10	45		40	6	6	
12	Brick manufactories.....	40	10			8	11			8,000		18,584	10	45		40	6	6	
13	Brick manufactories.....	40	10			8	11			20,687		18,584	10	45		40	6	6	
14	Brick manufactories.....	40	10			8	11			8,444		18,584	10	45		40	6	6	
15	Brick manufactories.....	40	10			8	11			118,148		18,584	10	45		40	6	6	
16	Brick manufactories.....	40	10			8	11			18,087		18,584	10	45		40	6	6	
17	Brick manufactories.....	40	10			8	11			18,388		18,584	10	45		40	6	6	
18	Brick manufactories.....	40	10			8	11			18,070		18,584	10	45		40	6	6	
19	Brick manufactories.....	40	10			8	11			15,450		18,584	10	45		40	6	6	
20	Brick manufactories.....	40	10			8	11			21,164		18,584	10	45		40	6	6	
21	Brick manufactories.....	40	10			8	11			8,008		18,584	10	45		40	6	6	
22	Brick manufactories.....	40	10			8	11			5,880		18,584	10	45		40	6	6	
23	Brick manufactories.....	40	10			8	11			5,346		18,584	10	45		40	6	6	
24	Brick manufactories.....	40	10			8	11			18,088		18,584	10	45		40	6	6	
25	Brick manufactories.....	40	10			8	11			17,600		18,584	10	45		40	6	6	
26	Brick manufactories.....	40	10			8	11			7,007		18,584	10	45		40	6	6	
27	Brick manufactories.....	40	10			8	11			34,550		18,584	10	45		40	6	6	
28	Brick manufactories.....	40	10			8	11			9,284		18,584	10	45		40	6	6	
29	Brick manufactories.....	40	10			8	11			8,008		18,584	10	45		40	6	6	
30	Brick manufactories.....	40	10			8	11			108,670		18,584	10	45		40	6	6	
31	Brick manufactories.....	40	10			8	11			108,670		18,584	10	45		40	6	6	
32	Brick manufactories.....	40	10			8	11			9,788		18,584	10	45		40	6	6	
33	Brick manufactories.....	40	10			8	11			8,008		18,584	10	45		40	6	6	
34	Brick manufactories.....	40	10			8	11			2,000		18,584	10	45		40	6	6	
35	Brick manufactories.....	40	10			8	11			5,075		18,584	10	45		40	6	6	

[illegible]

DICKINSON COUNTY.

[illegible]

DUBUQUE COUNTY.

[illegible]

Bettendorf Metal Wheel Co., Davenport.
The only exclusive metal wheel manufacturers in Iowa.

33	Wholesale fruits and produce.....	17	6	13	12,306	53	1
34	Wholesale groceries.....	69	7	59	70,557	53	2
35	Wholesale hardware.....	25	2	36	21,534	53	3
36	Wholesale liquor.....	12	5	15	7,885	53	4
37	Wholesale meats.....	6	6	6	3,900	53	5
38	Wholesale rubber goods.....	13	8	16	3,180	53	6
39	Wholesale spices and coffee.....	615	2	18	5,057	53	7
40	Wholesale and retail lumber.....	615	3	512	7,431	53	8
41	Wholesale wire works.....	6	5	6	189,040	53	9
42	Wood, coal and ice.....	27	6	27	3,000	53	10
	Total.....	100	104	104	3,306	53	11
	Average.....					40	1

BIMMETT COUNTY.

1	Fence manufactory.....	6	2	1,870	23	35
2	General merchandise.....	7	1	3,250	23	36
3	General produce, wholesale.....	6	6	3,125	23	37
4	Hardware, retail.....	3	5	2,940	23	38
5	Hotel.....	2	4	1,800	23	39
6	Laundry.....	20	7	1,100	23	40
	Total.....	1	5	1,800	23	41
	Average.....				47	5

WAYETTE COUNTY.

1	Canning vegetables.....	1	100	60	125	75	40
2	Hotels.....	2	3	17	8	23	41
	Total.....	4	103	67	133	97	42
	Average.....						24

FLOYD COUNTY.

1	Implement manufactory.....	1	8	11	1,241	40	8
2	Sash, doors and blinds.....	1	14	20	4,806	40	9
3	Store fixtures and furniture.....	1	25	25	4,900	43	10
	Total.....	3	57	56	10,947	43	11
	Average.....					43	14

[illegible]

1	Brick manufactory.....	1	6	7	\$	600	13	39	13	39
	Total.....	1	6	7	\$	600	13	39	13	39
	Average.....	1	6	7	\$	600	13	39	13	39

	1	1	26	—	24	—	—	\$	9,068	\$	9,466	34	18	—	40	13
1 Brick and tile manufactory	1	1	26	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	1	1	26	—	24	—	—	\$	9,068	\$	9,466	—	—	—	—	—	—
Average												34	18		40	13

1 Hotel	1	2	4	2	4	\$	1,200	\$	1,200	63	63
Total	1	2	4	2	4	\$	1,200	\$	1,200	63	63
Average	1	2	4	2	4	\$	1,200	\$	1,200	63	63

IOWA COUNTY.

[illegible]

JACKSON COUNTY.

1	Barrels and butter tubs.....	21	1	14	1	\$	5,328	31	6	22	5
2	Birds and the manufactory.....	10	3	11	3	7,848	50	25	2	10	2
3	Hotel manufactories and warehouses.....	6	6	5	6	5,000	53	50	3	50	3
4	Horse manufactories.....	58	27	27	27	24,890	33	4	10	30	30
5	Home manufactories.....	100	13	13	5	60,000	53	28	36	16	16
6	Saw mill and lumber.....	1	1	13	5	2,560	36	36	28	36	36
7	Woolen mill.....	14	4	13	5	2,560	36	36	28	36	36
	Total.....	21	13	130	13	\$ 100,074	\$ 30,225	36	7	6	3
	Average.....	7	10	21	13						

JASPER COUNTY.

	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2
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JEFFERSON COUNTY.

Brick manufacture	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Brick manufacture	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Total	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Average	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

KOSAUKE COUNTY.

[illegible]

LEE COUNTY.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Agricultural implements mfgs. and retail.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Bag manufactory	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Bakery	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Breweries	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Boot and shoe manufactories and retail.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78																						

LEE COUNTY—Continued.

Line No.	Kind of business.	No. employed, 1897.				No. reporting, 1897.	No. reporting, 1898.	Amount of wages paid out in 1897.	Amount of wages paid out in 1898.	No. weeks in operation, 1897.			No. weeks in operation, 1898.		
		Males.	Females.	Apprentices.	Total.					Full time, full force.	Short time, reduced force.	Suspended.	Full time, full force.	Short time, reduced force.	Suspended.
36	Wholesale groceries.	55	0	0	55	1	1	49,775	47,554	53	53	53	53	53	53
37	Wholesale	25	0	0	25	1	1	20,386	16,381	52	52	52	52	52	52
38	Wholesale and retail millinery.	14	2	1	17	1	1	10,600	10,600	53	53	53	53	53	53
39	Wholesale	34	2	4	40	1	1	23,810	23,810	53	53	53	53	53	53
40	Wholesale oils	20	2	0	22	1	1	8,000	11,000	52	52	52	52	52	52
41	Wholesale poultry, eggs and butter.	17	2	0	19	1	1	7,500	7,500	48	48	48	48	48	48
42	Wire fence manufactory.	17	1	0	18	1	1	1,875	1,875	7	7	7	7	7	7
43	Wood, for coal, retail.	161	1	0	162	2	2	18,400	17,000	44	44	44	44	44	44
44	Total.	3,913	774	54	4,741	53	53	\$ 1,155,801	\$ 1,732,345	45	45	45	45	45	45
45	Average.	117.1	25.1	1.7	143.9	1.1	1.1								

* 129 convicts. + 129 convicts. † \$17,010 for free labor.

LINN COUNTY.

Line No.	Kind of business.	No. employed, 1897.				No. reporting, 1897.	No. reporting, 1898.	Amount of wages paid out in 1897.	Amount of wages paid out in 1898.	No. weeks in operation, 1897.			No. weeks in operation, 1898.		
		Males.	Females.	Apprentices.	Total.					Full time, full force.	Short time, reduced force.	Suspended.	Full time, full force.	Short time, reduced force.	Suspended.
1	Agricultural implement dealer.	13	2	0	15	1	1	4,774	5,154	53	53	53	53	53	53
2	Bakery	25	1	0	26	1	1	11,750	9,000	53	53	53	53	53	53
3	Butter, cheese and creamery.	25	1	0	26	1	1	11,750	11,750	53	53	53	53	53	53
4	Butter, cheese and creamery.	25	1	0	26	1	1	11,750	11,750	53	53	53	53	53	53
5	Butter, cheese and creamery.	25	1	0	26	1	1	11,750	11,750	53	53	53	53	53	53
6	Butter, cheese and creamery.	25	1	0	26	1	1	11,750	11,750	53	53	53	53	53	53
7	Butter, cheese and creamery.	25	1	0	26	1	1	11,750	11,750	53	53	53	53	53	53
8	Butter, cheese and creamery.	25	1	0	26	1	1	11,750	11,750	53	53	53	53	53	53
9	Butter, cheese and creamery.	25	1	0	26	1	1	11,750	11,750	53	53	53	53	53	53
10	Butter, cheese and creamery.	25	1	0	26	1	1	11,750	11,750	53	53	53	53	53	53
11	Butter, cheese and creamery.	25	1	0	26	1	1	11,750	11,750	53	53	53	53	53	53
12	Butter, cheese and creamery.	25	1	0	26	1	1	11,750	11,750	53	53	53	53	53	53
13	Butter, cheese and creamery.	25	1	0	26	1	1	11,750	11,750	53	53	53	53	53	53
14	Butter, cheese and creamery.	25	1	0	26	1	1	11,750	11,750	53	53	53	53	53	53
15	Butter, cheese and creamery.	25	1	0	26	1	1	11,750	11,750	53	53	53	53	53	53
16	Butter, cheese and creamery.	25	1	0	26	1	1	11,750	11,750	53	53	53	53	53	53
17	Butter, cheese and creamery.	25	1	0	26	1	1	11,750	11,750	53	53	53	53	53	53
18	Butter, cheese and creamery.	25	1	0	26	1	1	11,750	11,750	53	53	53	53	53	53
19	Butter, cheese and creamery.	25	1	0	26	1	1	11,750	11,750	53	53	53	53	53	53

LUCAS COUNTY.

Line No.	KIND OF BUSINESS.	NO. EMPLOYED, 1897.			NO. EMPLOYED, 1898.			No. reporting, 1897.	No. reporting, 1898.	Amount of wages paid out in 1897.	Amount of wages paid out in 1898.	NO. WEEKS IN OPERATION, 1897.			NO. WEEKS IN OPERATION, 1898.		
		Males.	Females.	Apprentices.	Males.	Females.	Apprentices.					Full time, full force.	Short time, reduced force.	Suspended.	Full time, full force.	Short time, reduced force.	Suspended.
1	Broom manufactory	5	2	2	8	2	2	1	1	\$	\$ 1,800	47	...	5	30	14	8
2	Carriage and wagon manufactory	15	...	3	15	...	3	1	1	\$ 6,500	6,150	52	...	...	43	10	...
3	Coal mining	20	...	...	40	...	...	1	1	10,170	12,000	27	15	...	24	24	4
4	Hotel	6	8	...	11	12	...	1	1	1,998	4,240	52	...	...	52	...	...
5	Lumber and grain	50	...	...	40	...	...	1	1	35,000	20,000	52	...	...	52	...	...
6	Printing and binding	5	...	2	...	...	...	1	...	1,200	...	52	...	...	...	...	...
	Total	111	10	7	114	14	5	6	6	\$ 56,668	\$ 44,980	48	2	1	23	8	2
	Average .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

LYON COUNTY.

1	Hotel	1	4	3	5	7	...	\$ 1,092	\$ 1,900	52	...	...	...	...	52	...	...
	Total	1	4	3	5	7	...	\$ 1,092	\$ 1,900	52	...	...	...	...	52	...	...
	Average .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

MADISON COUNTY.

1	General merchandise	1	7	...	8	...	...	\$ 3,156	\$ 2,390	52	...	...	...	...	52	...	...
2	Hotel	1	3	5	3	5	...	1,416	1,522	48	...	4	...	...	52	...	...
	Total	2	10	5	11	5	...	\$ 4,572	\$ 4,912	50	...	2	...	...	52	...	...
	Average .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

MAHASKA COUNTY.

1	Bakery	1	4	1	5	1	1	\$ 1,560	\$ 2,500	52	...	...	...	...	52	...	...
2	Building and paving brick	1	50	...	50	...	...	15,000	17,500	25	...	25	...	...	30	...	...
3	Cigar factories	2	10	...	11	...	1	3,182	1,800	49	...	2	...	1	52	...	...
4	Clothing, retail	2	10	1	11	2	...	6,700	7,800	52	...	...	...	...	52	...	...
5	Coal mines	12	1,961	3	2,026	2	...	1,024,641	1,229,329	29	...	7	...	6	22	10	19
6	Dry goods and millinery	2	18	45	21	52	2	26,176	28,185	52	...	...	...	...	52	...	...

MARSHALL COUNTY—CONTINUED.

Line No.	KIND OF BUSINESS.	NO. EMPLOYED, N.Y. EMPLOYER				NO. WEEKS IN OPERATION, 1897.				NO. WEEKS IN OPERATION, 1898.			
		1897.		1898.		1897.		1897.		1898.		1898.	
		Males.	Females.	Males.	Females.	Apprentices.	Apprentices.	Full time, full force.	Short time, reduced force.	Suspended.	Full time, full force.	Short time, reduced force.	Suspended.
1	Quarrying stone.....	150	9	143	7	3	38,183	58	21	.....	58	21	.....
	Electric light.....	11	4	10	3	.....	10,612	58	.....	.....	58	.....	.....
	.....	3	1	2	.....	.....	2,860	58	.....	.....	58	.....	.....
	.....	30	4	26	.....	.....	2,860	58	.....	.....	58	.....	.....
	.....	.....	.....	44	5	.....	4,975	58	.....	.....	58	.....	.....
	.....	.....	.....	808	273	10	\$ 381,609	49	2	1	45	3	.....
	Total.....	38	40	38	40	10							
	Average.....												

MILLS COUNTY.

1	Neck yoke manufactory.....	1	1	7	7	.....	2,350	58	.....	.....	58	.....	.....
	Total.....	1	1	7	7	.....	2,350	58	.....	.....	58	.....	.....
	Average.....												

MITCHELL COUNTY.

1	Hotel.....	1	1	2	9	.....	2,972	58	.....	.....	58	.....	.....
	Total.....	1	1	2	9	.....	2,972	58	.....	.....	58	.....	.....
	Average.....												

MONONA COUNTY.

1	Hotel.....	1	1	3	4	.....	1,109	58	.....	.....	58	.....	.....
2	Borghum manufactory.....	1	1	11	11	.....	253	58	.....	.....	58	.....	.....
	Total.....	2	2	14	15	.....	1,362	58	.....	.....	58	.....	.....
	Average.....												

MONROE COUNTY.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	52
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MONTGOMERY COUNTY.

1	Brick and tile manufactories.....	45	16	50	1	\$	8,516	\$	11,608	34	13	10	30	28
2	Cinder and embossed stationary mfrs.....	50	1	16	1	1	21,000			26	26			
3	Dry goods, retail.....	2	4	1	16	1	2,076			33			32	
4	Food, retail.....	2	4	1	10	1	3,700			33			32	
5	Manufacturing box supplies and tanks.....	1	1	1	1	1	8,300			33			32	
6	Wholesale grocery.....	1	1	34	6	1	4,700			13	40		32	26
7	Wholesale grocery.....	1	1	1	1	1	8,400			33			32	
	Wholesale and retail flour and feed.....	1	1	12	1	1	6,516			43	4		48	4
	Total.....	9	10	159	56	10	65,229	\$	40,574	36	13	5	43	3
	Average.....													

MUSCATINE COUNTY.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
Brick manufactories.....</

O'BRIEN COUNTY.

[illegible]

OSCEOLA COUNTY.

1	Flour milling.....	1	6	7	\$ 4,000	\$ 5,000	53	53
	Total.....	1	6	7	\$ 4,000	\$ 5,000	53	53
	Average..							

PAGE COUNTY.

[illegible]

PALO ALTO COUNTY.

1	Blacksmith repairing and ice.	1	1	6	1	1	5,800	50	2
2	Oigar manufactory.	1	1	6	1	1	2,700	50	2
3	General merchandise.	1	1	6	1	1	1,800	50	2
4	Hotel and livery.	1	1	6	1	1	1,800	50	2
5	Marble and granite monuments.	1	1	6	1	1	11,000	50	2
6	Milling and grain.	1	1	6	1	1	2,400	50	2
7	Real estate and mortgages.	1	1	6	1	1	15,800	50	2
	Total.	7	7	42	7	7	50,116	50	2
	Average.								

PLYMOUTH COUNTY.

1	Brick and tile manufactory.	1	1	11	1	1	9,600	3	2
2	Foundry and machine shop.	1	1	11	1	1	1,200	3	2
3	General merchandise.	1	1	11	1	1	4,844	3	2
4	Hotels.	1	1	11	1	1	2,800	3	2
5	Merchant tailor.	1	1	11	1	1	2,800	3	2
6	Milling and grain.	1	1	11	1	1	28,000	3	2
7	Printing and publishing.	1	1	11	1	1	7,000	3	2
8	Waterworks and electric light.	1	1	11	1	1	4,300	3	2
	Total.	8	8	88	8	8	54,700	40	3
	Average.								

POLK COUNTY.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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Morrell Packing Co. (Limited), Ottumwa. The largest packing company in the state.

[illegible]

POTTAWATTAMIE COUNTY.

POTTAWATTAMIE COUNTY—CONTINUED.

Line No.	KIND OF BUSINESS.	NO. EMPLOYED, 1897.			NO. EMPLOYED, 1898.			Amount of wages paid out in 1897.	Amount of wages paid out in 1898.	NO. WEEKS IN OPERATION, 1897.			NO. WEEKS IN OPERATION, 1898.		
		Males.	Females.	Apprentices.	Males.	Females.	Apprentices.			Full time, full force.	Short time, reduced force.	Suspended.	Full time, full force.	Short time, reduced force.	Suspended.
1	14	1	.....	16	1	.....	8,800	6,900	63	13	.....	40	13	.....
2	27	.....	.....	26	.....	.....	7,100	11,000	40	.....	.....	40	.....	.....
3	45	3	4	47	3	5	27,000	16,473	28	4	13	43	4	6
4	10	.....	.....	11	.....	.....	5,170	31,700	51	.....	.....	52	.....	.....
5	31	.....	.....	28	.....	.....	14,822	5,000	36	14	.....	34	14	.....
6	23	1	2	23	2	10	14,822	13,146	30	15	7	53	.....	.....
7	14	.....	.....	14	.....	.....	6,000	10,000	53	.....	.....	53	.....	.....
8	15	.....	.....	14	.....	.....	6,544	6,500	53	.....	.....	53	.....	.....
9	13	.....	.....	14	.....	.....	8,400	8,400	51	.....	.....	52	.....	.....
10	15	2	.....	20	2	.....	11,800	14,800	53	.....	.....	53	.....	.....
11	10	.....	.....	11	.....	.....	7,000	10,000	53	.....	.....	53	.....	.....
12	14	.....	.....	.....	.....	.....	.....	2,803	.....	.....	.....	14	.....	.....
13	653	171	21	800	337	23	\$ 395,333	\$ 519,841	44	4	4	47	4	1
14	Total.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
15	Average.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

POWESHIEK COUNTY.

BINGGOLD COUNTY,

	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2
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BOOTH COUNTY,

Rank	Business	Capital	Assets	Liabilities	Net Worth	Income	Expenses	Profit	Loss	Other
1	Agricultural implements.	100	100	100	100	100	100	100	100	100
2	Bakery	100	100	100	100	100	100	100	100	100
3	Bakery	100	100	100	100	100	100	100	100	100
4	Bakery	100	100	100	100	100	100	100	100	100
5	Bakery	100	100	100	100	100	100	100	100	100
6	Bakery	100	100	100	100	100	100	100	100	100
7	Bakery	100	100	100	100	100	100	100	100	100
8	Bakery	100	100	100	100	100	100	100	100	100
9	Bakery	100	100	100	100	100	100	100	100	100
10	Bakery	100	100	100	100	100	100	100	100	100
11	Bakery	100	100	100	100	100	100	100	100	100
12	Bakery	100	100	100	100	100	100	100	100	100
13	Bakery	100	100	100	100	100	100	100	100	100
14	Bakery	100	100	100	100	100	100	100	100	100
15	Bakery	100	100	100	100	100	100	100	100	100
16	Bakery	100	100	100	100	100	100	100	100	100
17	Bakery	100	100	100	100	100	100	100	100	100
18	Bakery	100	100	100	100	100	100	100	100	100
19	Bakery	100	100	100	100	100	100	100	100	100
20	Bakery	100	100	100	100	100	100	100	100	100
21	Bakery	100	100	100	100	100	100	100	100	100
22	Bakery	100	100	100	100	100	100	100	100	100
23	Bakery	100	100	100	100	100	100	100	100	100
24	Bakery	100	100	100	100	100	100	100	100	100
25	Bakery	100	100	100	100	100	100	100	100	100
26	Bakery	100	100	100	100	100	100	100	100	100
27	Bakery	100	100	100	100	100	100	100	100	100
28	Bakery	100	100	100	100	100	100	100	100	100
29	Bakery	100	100	100	100	100	100	100	100	100
30	Bakery	100	100	100	100	100	100	100	100	100
31	Bakery	100	100	100	100	100	100	100	100	100
32	Bakery	100	100	100	100	100	100	100	100	100
33	Bakery	100	100	100	100	100	100	100	100	100
34	Bakery	100	100	100	100	100	100	100	100	100
35	Bakery	100	100	100	100	100	100	100	100	100
36	Bakery	100	100	100	100	100	100	100	100	100
37	Bakery	100	100	100	100	100	100	100	100	100
38	Bakery	100	100	100	100	100	100	100	100	100
39	Bakery	100	100	100	100	100	100	100	100	100
40	Bakery	100	100	100	100	100	100	100	100	100
41	Bakery	100	100	100	100	100	100	100	100	100
42	Bakery	100	100	100	100	100	100	100	100	100
43	Bakery	100	100	100	100	100	100	100	100	100
44	Bakery	100	100	100	100	100				

VAN BUREN COUNTY.

Line No.	KIND OF BUSINESS.	NO. EMPLOYED, 1897.				NO. EMPLOYED, 1898.				Amount of wages paid out in 1897.	Amount of wages paid out in 1898.	NO. WEEKS IN OPERATION, 1897.			NO. WEEKS IN OPERATION, 1898.		
		Males.	Females.	Apprentices.		Males.	Females.	Apprentices.				Full time, full force.	Short time, reduced force.	Suspended.	Full time, full force.	Short time, reduced force.	Suspended.
1	Cigar manufactory.....	1	.....	2	19	1	6	\$ 8.133	\$ 5.764	20	23	.....	25	10	.....	1
2	Coal mining.....	6	.....	.....	13	.....	.....	2,350	6,240	48	4	.....	55	.....	.....	2
3	Hotel.....	.....	.....	.....	3	.....	.....	.....	1,970	.....	.....	.....	25	.....	.....	.....
4	Woolen mills.....	25	25	.....	107	75	.....	12,173	49,993	30	24	8	35	25	.....	.....
	Total.....	50	35	2	143	35	4	\$ 19,503	\$ 63,497	29	20	8	30	15	.....	1
	Average.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

WAPELLO COUNTY.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

Wholesale	1	19	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
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WARREN COUNTY.

[illegible]

WASHINGTON COUNTY.

[illegible]

WAYNE COUNTY.

[illegible]

WEBSTER COUNTY—CONTINUED.

Line No.	Kind of business.	NO. EMPLOYED, 1897.				NO. EMPLOYED, 1898.				Amount of wages paid out in 1897.		Amount of wages paid out in 1898.		NO. WEEKS IN OPERATION, 1897.				NO. WEEKS IN OPERATION, 1898.			
		Males.	Females.	Apprentices.		Males.	Females.	Apprentices.						Full time, full force.	Short time, reduced force.	Suspended.	Full time, full force.	Short time, reduced force.	Suspended.		
1		1				1				2,000		2,200		53			53				
2		4				4				1,650		1,650		53			53				
3		4				4				5,327		5,327		53			53				
4		20				20				12,868		12,753		53			53				
5		32		2		32		1		19,000		21,457		53			53				
6		32		8		32		10		4,765		6,153		45			45				
7		50		70		50		50		40,800		40,800		45			45				
8		19		70		19		70		6,552		6,552		40			40				
9		75		47		75		47		5,121		5,121		36			36				
10		6				6				23,987		25,724		44			44				
11		3				3				2,400		3,517		8			8				
12		13		3		13		3		1,056		8,058		45			45				
13		13				13				17,112		21,107		53			53				
14		13				13				9,534		9,534		53			53				
15		14				14				6,898		6,763		53			53				
16		778	186	6		778	186	6						43	6	4	43	6	4		
17	Total									\$ 380,187		\$ 381,060									
18	Average																				

WINNESHIEK COUNTY.

RECAPITULATION OF

THE ENTIRE STATE.

RECAPITULATION OF THE

Number.	KIND OF BUSINESS.	No. reporting—1896.	No. reporting—1897.	No. reporting—1898.	NO. EMPLOYED —1896.			NO. EMPLOYED —1897.		
					Males.	Females.	Apprentices.	Males.	Females.	Apprentices.
124	Stock food manufactory.....	.....	1	.....	.....	.....	.....	5	.....	.....
125	Suspender manufactories.....	3	2	2	21	28	.....	10	26	.....
126	Syrup manufactories.....	2	1	1	207	2	.....	13	3	.....
127	Tannery.....	1	1	1	7	2	.....	4	2	.....
128	Telephone exchanges.....	15	18	14	82	150	.....	77	108	6
129	Tent and awning manufactory.....	1	1	1	17	11	.....	12	6	.....
130	Tool manufactory.....	1	1	1	12	.....	.....	12	1	.....
131	Trunk manufactory.....	1	1	1	4	1	1	5	1	1
132	Typewriter manufactory.....	1	1	1	85	2	.....	50	.....	.....
133	Vinegar and pickle manufactories ..	9	7	7	106	75	.....	88	28	.....
134	Wall paper and oils, retail.....	6	3	3	46	4	.....	41	6	4
135	Water tank manufactories.....	1	2	1	15	.....	.....	59	.....	.....
136	Waterworks.....	11	8	8	125	.....	.....	100	1	.....
137	Wholesale butter and eggs.....	18	9	17	266	65	.....	182	1	.....
138	Wholesale coal and wood.....	1	2	4	14	2	.....	12	.....	.....
139	Wholesale fruits.....	21	18	15	230	46	.....	172	36	.....
140	Wholesale leather.....	2	2	2	51	7	5	45	.....	4
141	Wholesale liquors.....	6	6	7	47	.....	.....	59	.....	.....
142	Wholesale meats.....	2	2	2	13	.....	.....	13	.....	.....
143	Wholesale oils.....	4	4	5	55	2	.....	56	2	.....
144	Wholesale rubber goods.....	1	1	1	7	1	.....	8	.....	.....
145	Wholesale salt and cement.....	2	2	1	62	1	.....	12	1	.....
146	Wholesale spice and coffee.....	4	4	4	60	12	.....	59	23	.....
147	Wholesale toys.....	1	1	1	10	2	.....	7	1	.....
148	Windmill manufactories.....	2	3	4	28	1	1	56	1	.....
149	Wire goods and fence manufactories	4	1	1	19	.....	.....	7	.....	.....
150	Woodenware manufactories.....	2	.....	.....	81	16	.....	.....	.....	.....
151	Woolen mills.....	8	7	6	91	78	.....	129	179	.....
Grand total and average.....		1,752	1,311	1,625	40,854	7,732	687	40,127	7,696	532

RECAPITULATION

MISCELLANEOUS

1	Iron, junk and rags.....	.....	.....	1	.....	.....	.....	.....	.....	.....
2	Building material.....	.....	1	1	.....	.....	.....	8	.....	.....
3	Clay pipe manufactory.....	.....	1	.....	.....	.....	.....	4	1	.....
4	Real estate and loans.....	.....	1	3	.....	.....	.....	9	10	.....
5	Sewer builders.....	.....	1	1	.....	.....	.....	162	.....	.....
6	Wholesale glass.....	.....	.....	1	.....	.....	.....	.....	.....	.....
7	Wholesale ice and cold storage.....	.....	5	10	.....	.....	.....	102	2	2
8	Wholesale saddlery.....	.....	1	1	.....	.....	.....	12	.....	.....
9	Incubator manufactory.....	.....	1	1	.....	.....	.....	25	3	.....
10	Carpet and rug machine manufact'ry	.....	.....	1	.....	.....	.....	.....	.....	.....
11	Steel and metal wheel manufactory.	.....	1	1	.....	.....	.....	125	.....	.....
12	Dyeing and cleaning.....	.....	.....	1	.....	.....	.....	.....	.....	.....

Cooper Wagon Co., Dubuque.
One of the largest manufacturers of wagons in the western country.

ENTIRE STATE—CONTINUED.

NO. EMPLOYED —1896.			Amount of wages paid—1896.	Amount of wages paid—1897.	Amount of wages paid—1898.	WEEKS IN OPERATION —1896.			WEEKS IN OPERATION —1897.			WEEKS IN OPERATION —1898.		
Males.	Females.	Apprentices.				Full force.	Short force.	Suspended.	Full force.	Short force.	Suspended.	Full force.	Short force.	Suspended.
11	44	...	13,410	1,800	10,584	40	11	1	52	...	...	47	...	...
29	15	...	87,800	4,800	10,000	34	18	...	51	1	...	48	5	...
6	1	...	5,000	1,500	8,000	52	...	...	52	12	4	35	9	...
76	125	3	106,229	77,197	92,666	52	...	...	52	...	12	52	...	17
17	8	...	4,040	2,749	3,688	30	23	...	22	30	...	26	26	...
19	...	...	7,800	8,320	10,400	52	...	...	52	...	...	52	...	...
5	1	...	2,400	1,900	2,280	48	4	...	40	12	...	52	...	...
118	4	...	57,688	22,000	50,782	20	32	...	52	...	...	52	...	...
90	44	...	78,447	64,125	60,515	41	11	...	46	6	...	45	7	...
50	5	3	21,855	27,569	30,401	52	...	...	48	4	...	39	13	...
34	...	...	2,895	9,875	8,300	20	32	...	32	12	1	12	40	...
117	1	...	79,740	75,085	84,016	43	7	2	52	...	...	52	...	...
810	8	...	116,936	56,887	101,402	33	13	1	43	8	1	39	11	2
52	...	...	7,000	7,450	23,680	52	...	...	46	6	...	50	1	1
205	30	...	123,274	90,738	122,147	50	...	2	48	4	...	49	3	...
39	...	4	24,644	22,321	20,000	49	3	...	52	...	...	52	...	...
80	...	...	30,730	35,638	46,269	52	...	...	52	...	...	52	...	...
14	...	...	9,500	8,516	9,712	52	...	...	52	...	...	52	...	...
61	6	...	47,844	45,960	59,114	52	...	...	52	...	...	52	...	...
6	...	...	6,225	6,682	5,067	52	...	...	52	...	...	52	...	...
8	2	...	23,595	8,000	4,000	52	...	...	52	...	...	52	...	...
69	18	...	65,634	67,713	77,662	52	...	...	52	...	...	52	...	...
8	2	...	6,125	5,000	6,000	52	...	...	52	...	...	52	...	...
123	1	6	7,546	23,700	42,247	34	15	8	52	...	...	48	4	...
8	...	...	5,964	1,275	1,370	26	26	...	7	45	...	26	26	...
...	...	...	22,042	...	...	27	20	5	...	...	...	...	...	...
194	205	...	42,633	30,689	112,563	33	3	16	35	6	11	34	11	7
45,006	9,800	623	17,369,622	17,656,724	19,622,892	40	8	4	44	5	3	45	4	3

BLANKS.

REPORTS.

10	...	...	...	5,000	...	...	...	...	52	...	...
10	...	...	6,400	7,500	...	...	...	...	52	...	...
...	...	...	1,500	...	...	...	...	...	52	...	...
23	16	1	7,144	23,123	...	...	...	...	52	...	...
10	...	...	17,000	5,350	...	...	...	...	36	16	26
35	...	...	...	15,000	...	...	...	...	...	...	...
247	2	...	23,750	54,423	...	...	...	...	34	15	3
15	...	...	5,375	7,300	...	...	...	...	52	...	...
20	5	...	10,863	12,500	...	...	...	...	52	...	...
8	1	...	...	4,438	...	...	...	...	...	...	...
250	...	...	59,256	111,128	...	...	...	...	50	2	...
2	3	...	...	2,175	...	...	...	...	...	...	...

RAILROAD STATISTICS.

The law regulating the bureau of labor requires that the information given in the biennial report shall be compiled by counties. In the case of railroad employes this could not be done, as the roads do not keep accounts by counties, therefore, the facts contained herein are from the railroad commissioners reports for 1897 and 1898:

EMPLOYES AND SALARIES—1907.

Mileage basis.

EMPLOYEES AND SALARIES, 1927—Continued.

EMPLOYES AND SALARIES, 1907—CONTINUED.

* Mileage basis. † Less one "other officer" at a salary of \$3,700.

BUREAU OF LABOR STATISTICS.

78

SALARIES—1907—CONTINUED.

EMPLOYER AND SALARIES-1902.

EMPLOYEES AND SALARIES—1898—CONTINUED.

EMPLOYEES AND SALARIES, 1908—Continued.

*Revenue train mileage basis.

BUREAU OF LABOR STATISTICS.

79

IOWA CONTINUED AND ENTIRE LINE.

STRIKES.

COUNTY.	1897.						1898.					
	No. of strikes.	No. persons involved.	Average days continued.	Loss of wages.	CAUSE OF STRIKE.		No. of strikes.	No. persons involved.	Average days continued.	Loss of wages.	CAUSE OF STRIKE.	
Appanoose.....	4	156	35	\$ 1,750	1 against		5	104	40	\$ 9,750	Could not agree on scale.	
Marion.....	1	80	150	5,000	.....		1	80	17	11,000	Higher wages asked.	
Mahaska.....	1	250	6	2,000	.....						
Keokuk.....	1	88	9	600	.....						
Wayne.....	2	118	8	2,300	screened coal.		1	18	7	250	Increased their work without in-	
Polk.....	9	605	40	\$1,704	For increase.						creasing pay.	
Jasper.....					For increase.		1	40	30	1,500	For increase.	
Webster.....					.....		2	497	104	44,000	Against reduction.	
Boone.....					.....						
Total.....	18	1,191	118	\$49,344			11	738	116	\$58,540		

PEARL BUTTON FACTORY.

The manufacture of pearl buttons from fresh-water mussel shells has grown to such magnitude in the past few years in Iowa that an attempt has been made by this bureau to furnish information regarding the same, that would give at least a fair idea of the amount of business done in this line. The United States fish commission, in its 1898 report, gives a very exhaustive résumé of the business, and the following from the pen of Hugh M. Smith, of that department, is so concise and covers the ground so thoroughly that it is herewith given in full.

Although the business of manufacturing buttons from the shells of our native fresh-water mussels is of quite recent origin, it has already attained comparatively large proportions and seems destined to have still further growth. The fear is entertained, however, that, through indiscriminate methods, the supply of mussels may be so seriously reduced that the continuance of the fishery and the dependent manufacturing may be imperiled. The possibility of the early exhaustion of the mussel beds in that part of the Mississippi river which is in Iowa and Illinois has led a number of interested persons to request the United States fish commission to make an investigation of the subject, as this is the section in which the business is most extensive and has been longest established. In compliance with this request the writer was assigned to the investigation and visited the centers of the business in July, 1898. The present report is based on the observations then made.

The principal inquiries were conducted at Muscatine, Iowa, the leading center of the button industry, although some other important places, as Clinton and Davenport, were also visited. Many fishermen and manufacturers were consulted with regard to the important features of the business. The manufacturers, without exception, furnished detailed statistics concerning their work. Those whom it was not practicable to personally visit were corresponded with, and, with few exceptions, they have supplied the desired data.

The statistics herein presented relate to the calendar year 1897, and to the first six months of 1898, when there was a remarkable development of the button-making business. The figures are the first which have been collected covering this industry, and will prove useful in determining the changes which may take place in subsequent years.

The investigation naturally embraced the following general topics, which are hereafter specially considered: (1) The mussels utilized in button-making, (2) the mussel fishery, and (3) the button industry. To these

is added a chapter embodying a statement of the measures that appear to be demanded in order that the stability of the industry may be maintained.

THE MUSSELS UTILIZED IN BUTTON-MAKING.

While there are probably 400 species of mussels found in the Mississippi river and its tributaries, comparatively few are now utilized in, or are adapted to, button-making. The requirements of a shell, from the button-maker's standpoint, are sufficient thickness, a uniform color of the surface and various strata of the shell, and a degree of toughness that will withstand the necessary treatment without cracking or splitting.

Thin-shelled mussels are absolutely useless for button-making. Even if originally as thick as a button, the necessary grinding and polishing reduce them to mere wafers. The preferred color is white, but cream-colored shells are also employed. Shells with pink, purple, yellow or salmon-colored nacre are not suitable, as the color fades with age and is apt to be not uniform. Certain shells that satisfactorily combine thickness and color are nevertheless useless, because they are soft or brittle and break easily during manufacture. Dead shells that have been exposed for a long time to the action of air or water also become useless for button-making.

Mr. Charles T. Simpson, of the department of mollusks of the United States National museum, has courteously supplied the newly revised scientific names for the mussels used in the button industry, and has given valuable information concerning this family of mollusks, with which he is so familiar. For a very interesting and timely article on the fresh-water mussels, considered from the standpoint of the biologist, reference is made to Mr. Simpson's paper entitled "The pearly fresh-water mussels of the United States, their habits, enemies, and diseases, with suggestions for their protection," published in the bulletin of the United States fish commission for 1898.

Coincident with the establishment of the mussel fishery and button industry in Iowa and Illinois, there has arisen a new popular nomenclature for the mussels or "clams" utilized. The names applied by the fishermen and manufacturers have some reference to the color or shape of the shells. Originally quite local, they are now generally applied throughout the whole stretch of river in which fishing is done.

The principal species of mussel in the Mississippi river used in button-making is *Quadrula ebena*, generally known as the "niggerhead." This species has the general shape of a common round clam (*Venus mercenaria*), and is characterized by a very thick and heavy shell, with a black or dark-brown outside skin, and a glistening white interior, the latter color being uniform through the thickness of the shell. It is of relatively small size, the maximum being only four and one-half or five inches for the greatest outside diameter, and the average about three inches. Many less than two inches wide are also unnecessarily destroyed. It is often found over immense areas, preferring muddy sand and muddy gravel bottom, but also frequenting sandy bottom. In some places a form of this mussel known as the "mud niggerhead" is sparingly used. It is found on muddy bottom, and has a thicker shell and a more intensely black epidermis than the common form.

Several abundant species of mussels resembling the niggerhead in shape, but differing from it in having tubercles or excrescences on the outside of the valves, are locally known as "warty-backs" or "warty-back niggerheads" (*Quadrulapustulosa*; *Q. metanevra*). They have very little value for buttons, the warts causing the shell to crack during cutting.

Another species of this class that is abundant, but only sparingly used, is the "bullhead" (*Pleurobema cespitosus*). It is found with the "niggerhead," has a thick shell with a blackish-brown skin and a white interior, and externally presents several radiating ridges. It is of little value, as the shell is brittle and cracks in cutting, and the buttons also split in facing and drilling.

There are several kinds of mussels known along the Mississippi as "sand shells." The most abundant and important of these is the "yellow sand shell" or "yellowback" (*Lampsilis anodontoides*), which has a bright yellowish-brown epidermis, and a faintly cream-colored interior. Another species with a black exterior is known as the "black sand shell" (*Lampsilis rectus*). The sand shells are found chiefly on sandy bottom, and are reported to be quite active, moving toward the shores in the morning and back toward the channel in the evening, making conspicuous tracks on the bottom. These mussels, which are long and narrow, reach a length of six inches, and are highly valued in button-making.

A smaller species is the "slough sand shell" (*Lampsilis fallaciosus*), which seems to be most common in or near the mouths of narrow arms of the river, especially coves that extend into islands. It is less generally distributed in the river than the "yellow sand shell," occurs in much smaller beds, and is now quite scarce in most places where extensive fishing has been carried on. It is considered very good for buttons, having a beautiful pearly color and uniform thickness. It has been practically caught out in the vicinity of Muscatine, near which place a bed yielded ten tons a few years ago and ceased to exist.

Ranking next to the sand shells in abundance is the species known as "mucket," "mouket," or "mougat" (*Lampsilis ligamentinus*). It attains a length of six inches, but the average size of those utilized is only about four inches. It has a dark brown exterior and a creamy-white nacre. Only second-class buttons are made from it, as the front part of the shell is thin and the back part brittle. New factory hands are usually set to work on this species.

One of the best mussels for buttons is known as the "deerhorn" or "buckhorn" (*Tritigonia verrucosa*). It is not abundant, and the supply is irregular and uncertain. It attains a large size; examples over nine inches long have been taken from the Iowa river, and in the Mississippi it reaches a length of six inches or over, the average being about five inches.

A rare but very desirable mussel is the species locally known as the "butterfly" (*Plagiola securis*), in allusion to the shape of the valves. The flat shell is of small size, but thick and of fine color. The epidermis is reddish-brown, marked by dark radiating lines. In 100 tons of miscellaneous shells from the Mississippi river, in the Muscatine section, there are likely to be only a few hundred pounds of "butterflies." In the Illinois, Ohio, and some other tributaries of the Mississippi, this mussel is abundant.

A mussel not very highly regarded by the button-maker, but sometimes used, is the so-called "blue-point" (*Quadrula undulata*). It has a large, thick shell, with a wavy exterior; the nacre at one end is usually of a bluish or purplish color, in contrast with the white surface of the remaining part. The chief objection to its employment in button-making is the lack of uniformity in color.

Another species not highly regarded is the "hatchet-back," or "hackle-back" (*Symphynota complanata*). This is a large, black mussel, with a projecting wing. The valves are thin and of an undesirable color, and only a very small section of each is suitable for buttons.

Several species of "pocketbook" clams (*Lampsilis capax* and *L. ventricosus*) are more or less abundant, and yield a good button of medium thickness. They are characterized by having rounded valves of great depth.

Nearly all the tributaries of the Mississippi in this section contain mussels in some abundance, but no mussel fishing is done in them. The Iowa and Cedar rivers, for instance, have a good supply of large "muckets" and large "blue-points," which are the principal species; also pink and white "hatchet-backs," a few fine "sand shells," a very few "niggerheads" and "pocketbooks," and some extra large "deerhorns" of good quality; the last named constituting about 10 per cent of the mussels adapted for button-making. There is no fishing now carried on in these streams, although there was a little six years ago. It does not pay to ship the shells, and there is no local demand. In the Skunk and Des Moines rivers there are some shells that might be utilized, but they are not sufficiently abundant to maintain a large factory. Among others there are small, brittle "muckets" of little value, a few desirable "pocketbooks" and "sand shells," and some very good, medium-sized "deerhorns." In Rock river, Illinois, there is reported an enormous growth of "muckets," which are not utilized.

A number of animals prey on the mussels, among them the muskrat, the mink, and the raccoon; the first named being especially destructive. Catfish are also said to eat mussels. Hogs are known to be very injurious in some parts of the country.

Physical causes are undoubtedly responsible for extensive destruction of mussels. During freshets mud and sand are deposited on the beds and bury the mussels. Shifting sandbars are also known to cover up beds. The fishermen sometimes find extensive beds of dead shells which appear to have recently been uncovered by the current. During freshets, when the streams find new channels, many mussels are carried from their beds and left dry when the water subsides. Droughts, also, are liable to expose mussel beds and cause much destruction.

Pollution of the water by refuse from cities and manufacturing establishments is perhaps the most serious menace to the mussel beds, next to the operations of the fishermen. Certain kinds of refuse are very destructive, and are capable of killing practically every mussel with which they come in contact.

Fishermen and button-makers report a considerable percentage of "niggerheads" with the beaks partly gone, the remaining portion being softened and easily split into laminæ. Accompanying this condition there is often a softening of the other parts of the shell in spots. Only the

larger (older) shells are thus affected, and it appears to represent a natural decay due to age. Buttons made from such a shell are soft, and are apt to split up into layers in the course of manufacture.

For much interesting information concerning the habits, spawning, mode of dispersal in the streams, rate of growth, etc., of the mussels, the paper of Mr. Simpson should be consulted.

THE MUSSEL FISHERY.

THE FISHERMEN.

The mussel fishermen in the region under consideration are mostly people who have been engaged in other branches of fishing, or who, as boatmen, etc., are familiar with the river. Many of them depend on mussel fishing for their livelihood and follow it throughout the year, but others seek mussels only when their regular work is suspended. Thus, in winter especially, the ranks of the regular mussel fishermen are considerably augmented by sawmill hands, farm hands, and others. Owing to the increase in the mussel fishery during the past two or three years, it is said that many farmers have had difficulty in obtaining men to work on their farms.

It is reported that in 1897 there were, between Burlington and Clinton, in Iowa, over 300 persons who engaged in taking mussels to sell to the button manufacturers at the various towns along that part of the Mississippi. In 1898 the number of fishermen between Ft. Madison and Sabula was estimated at 1,000. As many of the fishermen have no permanent headquarters, but move from place to place, it is difficult to obtain an accurate statement of their number.

The leading fishing and button manufacturing center is Muscatine, at which place, in 1898, there were about 100 mussel fishermen. On an extensive and productive bed as many as 150 to 300 fishermen may be engaged at one time.

In view of the small amount and inexpensive character of the apparatus required to prosecute the fishery, the comparative ease with which the mussels are taken, and the little experience required, mussel fishing is regarded with favor by many men, as they are readily able to get their catch to market and dispose of it, receiving cash in payment. When they find a good mussel bed they sometimes make \$30 or more per week. The average earnings, however, are considerably less; at this time probably being less than \$10 per week. Some days \$2 or \$3 will be made, but inclement weather prevents fishing and reduces the average.

The income of the mussel fishermen is now generally less than formerly, owing to the increase in the number of fishermen, the lower prices received for their catch, and the reduced abundance of the mussels.

APPARATUS AND METHODS.

Owing to the comparatively shoal water in which mussels are found, they may be gathered with less difficulty than is ordinarily encountered in taking shellfish. Furthermore, the shoalness of the Mississippi makes every part of it accessible to the fishermen, and renders the exhaustion of the beds more certain, speedy, and complete.

Mussels are obtained with various kinds of apparatus. Those which have been or are now in use are the hand rake, the tongs, the rake hauled by means of a windlass, the dredge operated by steam, and the bar with hooks.

The rakes are of several patterns, but all are essentially alike. The commonest form, known as the shoulder rake, has a wooden handle 14, 16, 18, or 20 feet long attached to one side of an elliptical metal frame; on the under side of the frame are 12 to 14 iron teeth, 5 inches long; the head of the rake is converted into a kind of basket, by a piece of coarse wire netting attached to the frame; the mouth of the basket is 8 inches deep, 6 inches wide, and 16 inches long. The rake is used from an anchored boat. The handle is placed over the fisherman's shoulder, and the rake is placed up-stream to the full length of the pole. The fisherman then slowly works the rake toward his boat, being aided in this by the action of the current on a broad wooden piece nailed crosswise near the base of the handle. The rake is then lifted perpendicularly from the water and the mussels are emptied into the boat. This rake is also used through the ice.

The tongs, which along parts of the Mississippi are called "scissor rakes," are similar to the ordinary oyster and clam tongs. They are used in water as deep as 15 feet, but usually in only 10 feet or less. The value of the tongs is \$3 or \$3.50 each.

The dredge or rake used with a windlass, locally known as the "drag rake," is larger and heavier than the shoulder rake, and of different shape. It has a rectangular iron framework, covered with narrow strips of hoop iron placed about an inch apart. The apparatus has the appearance of a flat cage, with long teeth projecting obliquely downward from the anterior lower margin. The rake, with the windlass and rope, is worth about \$25.

A large steam scow for taking mussels, owned at Muscatine, is unique. It is provided with a huge rake, or dredge, operated by steam. The rake is made of iron, and weighs 500 pounds. It is 48 inches long, 18 inches wide, and 30 inches deep, and is provided with 25 8-inch teeth. The rake is operated in a recess or slot in the bottom of one side of the scow. This recess is 5 feet wide and 40 feet long, and is surmounted by a framework with a double track, on which the heavy timbers supporting the rake slide while the rake is being dragged along the bottom. A perpendicular beam is attached to the rake, by means of which it is raised and lowered and dragged from the forward end of the recess. The length of this beam is such that the rake may be used in water as deep as 22 feet. This vessel carries a crew of four men, and cost several thousand dollars. It has not been sufficiently used to demonstrate whether it can be profitably employed with the mussels so much less abundant and more scattered than formerly.

In the spring of 1897 a very ingenious contrivance for taking mussels came into use and is now the leading means of capture. It consists of a circular rod, 6 feet long, of $\frac{3}{8}$ -inch iron, to which are attached, at intervals of about 6 inches, series of four-pronged hooks, made of stout (No. 9) wire. These hooks are made of two pieces of wire, so fastened together that the prongs will be at right angles to each other. The hooks are 4 inches long, and are fastened to the iron bar in strings containing two or three hooks, which are attached to each other and to the bar by twine, pliable wire, or chains, so they will be freely movable. A strong piece of rope is tied at or

near each end of the bar, forming a bridle, to which is fastened the bail, or the rope by which the dredge is pulled. This rope is about 25 feet long. The quantity of hooks varies with the length of the bar and the number in each string. A 6-foot bar, with 3 hooks on each string, the strings being 6 inches apart, would have 39 hooks. A 7½-foot bar, with only 2 hooks on a string, and the strings 4 or 5 inches apart, would contain 46 hooks.

In allusion to the shape of the hooks, this apparatus is locally known as the "erowfoot" dredge or rake.

The usual outfit for a fisherman is two dredges, valued at \$1.50 to \$2 a pair.

A modification of this appliance consists in putting wooden wheels, six inches in diameter, on the end of the iron bar, so that the bar will clear the bottom as the dredge is hauled, and will not disturb the beds.

This apparatus depends for its action on the habits of the mussels.

They rest on the bottom, or partly buried in the mud or sand, with the free margin of their shells turned upstream and with their shells separated to admit the water, laden with oxygen and food. When touched they quickly close their shells, and if a foreign body is interposed between the valves it is tightly grasped and retained.

The method of using this appliance is as follows: The fisherman throws it overboard from his boat and allows the boat to slowly drift downstream. As the numerous prongs come in contact with the open shells, the latter quickly close on the hooks and retain a tight hold. After drifting for a short distance, say fifty feet, the dredge is drawn in and the mussels removed from the prongs, considerable force often being required to detach them. In order to facilitate the handling of the dredge, the fishermen place two upright forks on each side of the boat, on which the dredge-bar rests, the hooks swinging freely. The shorter bars are supported across the ends of the boat, while the larger ones rest on side uprights. While the mussels are being taken from one dredge, the other is being dragged and is ready to be hauled in by the time the first is stripped.

Anyone who has not witnessed the use of this apparatus can scarcely realize how remarkably effective it is. Often when the mussels are abundant almost every prong will have a mussel on it, and two or three are sometimes caught on one prong. The writer saw 60 marketable mussels taken on 39 hooks, and has often observed large clusters of shells on a single string of hooks. When the beds of mussels are compact one man can take 800 to 1,000 pounds of "niggerheads" in a day, and a case is reported where 2,200 pounds were obtained by one man in ten hours. The average daily catch at present, however, is probably not over 500 pounds.

On account of the cheapness and efficiency of this apparatus, together with the ease of operating it, it has become very popular with the fishermen and has practically superseded all other appliances. It is said to reduce the labor of fishing about half, as compared with the shoulder rake and dredge. Another advantage is that it takes only live shells, while the other appliances are often loaded with dead shells, trash, etc. By its use a larger area can be covered and fishing done on grounds that could not be profitably worked by any other means, owing to the shells being much scattered.

After sufficient ice forms on the river there is considerable mussel fishing through the ice with "shoulder rakes" and "scissor rakes." For the use of these appliances under such circumstances a hole 2 to 6 feet square is cut through the ice.

Ice fishing presents an interesting scene when large numbers of fishermen are working at one time on the same ground and engaged in the various steps of the business—some sawing holes through the thick ice, some drawing their rakes, some sorting their catch, some taking their catch to shore, and some returning to the grounds with their empty vessels.

Among the illustrations herewith presented are two showing men engaged in ice fishing near Le Claire, Iowa, in the winter of 1898-9. The bed on which the fishing is being done is nearly a mile long and about 100 yards wide. It has been worked for several years, in both winter and summer, and has yielded large quantities of "niggerhead" mussels. On one occasion, in the winter of 1898-9, 142 men were digging mussels at one time on that part of the river shown in the views, and up to the latter part of February they had obtained over 500 tons of shells from this section. When the photographs were taken, shortly after a period of excessively cold weather, when fishing was suspended, only a few of the fishermen had returned to work. The ice is 12 to 28 inches thick and the water over the bed is 8 to 14 feet deep. One man is seen sawing a hole through the thickest ice. Some men work alone, others in pairs. When two operate together, one uses the rake while the other sorts the mussels, frequent change of duty being made, as the hauling of the rake is quite arduous. One of the long-handled rakes with fine, long tines, is shown. One man can dig or rake from 600 to 800 pounds of shells daily on such a bed. They are sorted in pails, emptied into box sleds, and hauled over the ice to the place where they are weighed and paid for.

The fishermen who use the shoulder rake or "crowfoot" have small flat-bottomed skiffs, worth from \$5 to \$10 each. Those employing dredges have a barge or flatboat with deck-room sufficient for the manipulation of the windlass and dredge, and also a temporary cabin. Such a boat is valued at \$20 or more.

Some fishermen have large houseboats, which are moored at places convenient to the fishing grounds and serve as temporary homes. The value of such boats is about \$200. Usually a fisherman and his family will occupy one boat, and live very comfortably during the fishing season.

The fishermen have crude, oblong tanks, located at some convenient place on the shore, made of sheet iron, capable of holding water. A fire is built under the tanks, and the mussels are boiled 10 or 15 minutes in order to kill them and permit the extraction of the fleshy part. Under the influence of the heat the shells open, and the meats either fall out or are readily picked out by hand. After being thus prepared, the shells are loaded in sacks and sent by steamer to the button factory, or they may be taken to market in the fisherman's boat. Sometimes large scows are loaded with shells at a camp and towed to the factory town by a tug. Shells are also sold on the shore to buyers representing the local button-makers, or factories in other states.

The Morrison Manufacturing Co., Manufacturers of Farm Tools, Ft. Madison. Located on the original site of the old fort, a cut of which will be found on a following page.

A view is presented showing a part of a "boiling-out" shed, at Le Claire, Iowa, where many of the fishermen disposed of their catch in the winter of 1898-9. The shed, which is 40 feet square, has three furnaces, on which are huge boiling pans, each holding 20 bushels of mussels. The mussels are boiled for about 15 minutes and then thrown out on tables, when the meat easily comes from the shells as they are broken or pulled apart and thrown into a heap. When photographed, this shed contained 200 tons of cleaned shells, while outside were 350 tons in heaps.

The fishermen make no use of the "meats" removed from the shells in cooking. In some places the meats are eagerly sought by farmers who go to the fishing shores, collect this waste product without cost, and feed it to hogs and poultry. It seems probable that the fishermen might add materially to the proceeds of their fishing by finding a market for this waste. The quantity is, in the aggregate, large, amounting in the first half of 1898 to fully 500 tons. From a ton of niggerhead mussels as taken from the water over 300 pounds of meats may be obtained. The food value of the mussels is practically nil, and only limited quantities are used for bait in line fishing. It is possible, however, that a market for the meats, in a salted condition, may be found in the Atlantic coast states, where salt clams are extensively employed in the line fisheries for cod, haddock, hake, and other ocean fishes. Recently, considerable quantities of fresh-water mussels, taken from ponds in southern Massachusetts, have been salted and sold to cod fishermen at a good price (\$4 or \$5 per barrel of 200 pounds). Even at \$3 per barrel, the Mississippi river fishermen could well afford to send their waste mussel meats by freight to the coast. It is not known just what effect cooking has on the quality of the meats, but it is thought that this process does not seriously impair their value as bait.

THE FISHING SEASON.

In the early days of the industry fishing was carried on from about August to December, but of late it has been conducted throughout the year, even after the river is frozen. The principal fishing, however, is still done in late summer and fall, when the river is lowest. On one bed, near Muscatine, 50 persons were at times engaged in ice fishing in the winter of 1897-8, and on other large beds as many as 200 persons have been employed at one time. Ice fishing is of comparatively recent origin, having been first carried on only during the winter of 1896-7. The quality of the shells is better in cold weather for the purpose of the button-maker. The mussels are then less brittle, while warm weather, with prolonged exposure in boats, makes them brittle.

The question of a close season for the mussel fishery, in order to afford the mussels a respite from incessant hunting, especially during their spawning time, is now being agitated, and is hereinafter discussed.

THE FISHING GROUNDS.

The Iowa and Illinois button factories located on the Mississippi river obtain their supply of shells from grounds which extend from Ft. Madison, Iowa, to Sabula, Iowa. This section of the river is 167 miles in length, following its sinuosities, although the distance in an air line between the points named is only 118 miles. The average breadth of the river is two-

fifths of a mile; the maximum unobstructed width being about one mile, just north of Campbell Island, between Le Claire and Davenport.

This part of the Mississippi is quite shallow at the mean stage of the water. The usual depth in the channel is 12 to 14 feet; the deepest water being only 33 feet. On either side of the channel the bottom generally slopes gradually to the shores. In the latter part of summer and the early fall the depth is always reduced by the diminution in the volume of water coming downstream, while in winter, spring, and early summer the river is swollen by rains and melting snows; there being every season a freshet of greater or less severity.

The character of the bottom varies greatly, but it is usually sandy; sandbars and low, sandy islands being common features. There are, however, more or less extensive areas of muddy bottom, and in some places rocky or gravelly bottom prevails.

Owing to the shoalness of the river, and the character of its bed, the annual freshets produce marked changes in the bottom topography. These changes have an important relation to the mussel beds, which are sometimes entirely swept away, and sometimes completely destroyed by being covered with sand or mud; such beds of dead shells are not infrequently found by the fishermen when subsequent freshets have swept off the overlying sand or mud.

Throughout the river section mentioned mussels are found in scattered or in condensed bedies. The natural tendency of some of the species is to form more or less dense beds, while others seem to be uniformly distributed. Considered as a whole, this part of the Mississippi river is undoubtedly one of the most favored sections of the United States as regards abundance and variety of mussels adapted for buttons. By far the greater portion is taken from special areas on which they are more abundant and more closely grouped than in other places. Such beds, which are sometimes of great extent, have their principal axis lengthwise the river, and are often quite narrow.

On some grounds practically all of the mussels are of one species, while on others several species may be mixed in varying quantities. The largest and most compact beds are formed of "niggerheads" and "muckets." On new grounds the "niggerheads" are sometimes so thickly disposed that practically the entire bottom over a large area is covered, and the shells are often found several layers deep. In holes or depressions in the sandy or muddy bottom "niggerheads" are often discovered in thick piles, and many bushels may be taken from one of these holes.

Owing to the crowding of the mussels some of the fishermen think that fishing is beneficial to the beds, in that it spreads the mussels over a larger area, and permits a more rapid growth and increase of those that remain. There is a popular belief among some of the fishermen that depleted beds may be re-established in three years—that is, the mussels are thought to reach a marketable size in three years after the young are hatched. Most of the fishermen and manufacturers, however, have no definite knowledge as to the rate of growth, although all think it more rapid than is actually the case.

Among the noteworthy mussel beds that have been worked in the past few years are the following:

In 1896 a bed of "niggerheads" and "muckets" in front of Muscatine, about 2 miles long and $\frac{1}{2}$ mile wide, yielded 500 tons of shells.

A very large bed was discovered near New Boston, Ill., a few years ago. It was about $1\frac{1}{2}$ miles long and 60 rods wide, with the shells very thickly disposed. It is reported that fully 10,000 tons of shells, chiefly "niggerheads" and "muckets," with a few "sand shells," were taken during the past three years. The number of mussels represented by this enormous quantity was probably not less than 100,000,000.

There is a very large and productive bed 3 or 4 miles below Clinton, on the Illinois side of the river; it is a mile long and several hundred feet wide. The shells, in places, are reported to be several feet deep, but the greater part of those lying deepest are dead.

One of the most noted beds in the upper river is near Camanche.

In 1898 the principal mussel fishing was done between Davenport and Clinton. While other parts of the river were also resorted to by the fishermen, the bulk of the catch was from beds in the upper river that had not been so actively worked as those in the vicinity of Muscatine and other places as far down as Burlington.

In July, 1898, when the writer visited the river, a number of camps of "clam" fishermen were met with between Davenport and Clinton. One of these, located directly on the bank of the river, was quite extensive and presented an interesting scene as the numerous boats brought in the shells from the adjacent river, and as the catch was being cooked and piled up at the headquarters of each crew. The principal apparatus in use along this section was the grapple, although a few shoulder rakes and drag rakes were also seen.

The shells for the Davenport factories come chiefly from the vicinity of Princeton, where there is a great abundance of mussels. In May, 1898, the fishermen were restricted in bringing in their catch, as the factories could not handle all of it. Although there are a good many "muckets" in the river in the vicinity of Davenport, there was in 1898 no demand for them.

Reference has already been made to the productive bed near Le Claire, Iowa.

DEPLETION OF THE GROUNDS AND ITS CAUSES.

Although the mussel fishery along this section of the Mississippi river is under ten years old and in most places began within the past two or three years, it has already had a pronounced influence on the productivity of the mussel beds and bids fair to lead to serious consequences to the capital invested in the button industry of the states of Iowa and Illinois. Throughout this stretch of river, wherever fishing has been at all regular or active, there has been a more or less marked reduction in the abundance of mussels of all kinds utilized in making buttons, and in some localities the depletion of the grounds has been almost complete.

The manufacturers generally recognize the present tendency toward the practical exhaustion of the available grounds, and feel the need of some action that will place the industry on a permanent basis. The fishermen also, however loath they may be to acknowledge it, have practical evidence that the mussel grounds are capable of depletion and are being greatly reduced in productiveness. The many persons financially interested in

the mussel fishery and the button industry are very desirous that appropriate measures be taken to insure the existence of a substantial business of this kind. Suspension of the industry along this part of the river—which is not a remote contingency—would prove a calamity to many of the communities.

The present condition of the principal grounds, before referred to, illustrates the serious effects of indiscriminate fishing, and emphasizes the solicitude felt by the button-makers and others for the maintenance of the supply. Thus, the large bed in front of Muscatine was unable to stand the drain of one year's fishing, and now yields few mussels. The New Boston bed, reported to be the best in this section of the Mississippi, was so assiduously worked that it was completely exhausted, few fishermen resorting to it in 1898. The abundance of mussels was incredible, and yet a few seasons' operations depleted this ground. It is reported that when fishing first began on this bed some men took as much as 1,500 to 2,000 pounds of shells in a day's fishing, but now a fisherman would have difficulty in getting that quantity in a week.

Between Burlington and Davenport the condition of the beds is such that many fishermen no longer resort to them, but go to grounds that have been worked for a shorter time. Up to July, 1898, there had been no noteworthy decrease in the mussels in the river near Davenport, but the fishery there is still quite young, and the manufacturers are anticipating a decrease.

Owing to the very slow growth* of the mussels and the comparative facility with which the fishermen exhaust new grounds, there is no reason to believe that depleted beds will recuperate while the grounds on which fishing is now being done continue to be productive, so the indications are that the conditions will steadily grow more unsatisfactory.

The history of the fishery up to this time shows the disregard for the future which has come to be regarded as characteristic of fishermen. The decrease in the mussel supply has been brought about by several practices. The principal factor has been the activity of fishing operations. Not only have large quantities of mussels been taken from the bed at one time, but the fishing has been so incessant that no opportunity has been afforded the beds to recuperate. The shoalness of the water has made it possible to thoroughly scour almost every foot of ground. The high water that prevails during a part of the year was formerly a protection to mussels at an important time, but it is no longer, as the present apparatus may be used at all times when a boat can be managed.

The failure of the fishermen to suspend their operations immediately prior to and during the spawning season of the principal species of mussels has undoubtedly had a serious effect on the supply. This question has been freely agitated in the local press, and the sentiment among most of those interested, including fishermen, favors protection for the mussels at this critical time. Under the impression that the spawning occurs in spring, they advocate a close time at that season.

* For example, the time required for a "niggerhead" mussel, under normal conditions, to reach a size of 3 inches is not less than 10 years and is perhaps generally as much as 12 years, while a shell $4\frac{1}{2}$ inches in diameter is from 15 to 18 years old.

A good many fishermen and manufacturers expressed the view that ice fishing is unduly destructive, owing to the fact that enormous quantities of mussels—some as small as 1 inch in diameter—are brought up and left on the ice to freeze and die. These, in open water, would drop back or be thrown back as the catch is removed from the rakes or tongs, or when the boats are cleaned. Aside from this damage, many think the shells should be unmolested during the winter, when they are more or less dormant. Many persons expressed themselves as favoring the prohibition of ice fishing.

The suspension of the ice fishing and spring fishing would, of course, keep many fishermen out of employment at a time when they need ready money. There is little reason to believe, however, that it would reduce their annual earnings, even at the outset, while ultimately it would undoubtedly prove financially beneficial. The manufacturers report that no injury would result to the button business from their failure to receive shells during a closed season, as they could—as most of them now do—lay in sufficient supply in summer and fall to keep the factories running.

Not the least injurious feature of the fishery is the gathering of small mussels for market and the incidental destruction of small shells that are not utilized, but left on the banks or the ice to die. The testimony of the button manufacturers and the evidence afforded by their shell heaps indicate that there are comparatively large quantities of immature mussels taken. This practice depends to some extent on the depletion of the grounds of the larger mussels, necessitating the gathering of the smaller ones to make a fair catch, but also on the indifference of the fishermen to the great injury thus done the mussel supply. The manufacturers are, of course, equally indiscreet in continuing to purchase lots of small shells, and a few of them refuse to do so, but it is generally not feasible to exclude the small shells mixed with the larger ones. The desire that there should be some restriction on the size of the shells taken is quite general among the manufacturers. However, as long as the fishermen bring them in the manufacturers will buy them. Some of the button-makers, indeed, prefer comparatively small shells—say niggerheads $2\frac{1}{4}$ or $2\frac{1}{2}$ inches in diameter—for the reason that their quality is as good as or better than many of the large shells, and the waste is relatively less.

If no mussels smaller than $2\frac{1}{4}$, $2\frac{1}{2}$, or even 2 inches in diameter, were gathered, the matter would not be so serious, although it must be acknowledged that shells less than $2\frac{1}{4}$ inches in diameter are very small, but many mussels only an inch in diameter have been sacrificed, and some of the manufacturers report that considerable numbers of shells no larger than a nickel or a dime are brought in. From a niggerhead shell an inch or less in diameter only one medium-sized blank may be sawed. Thus, for two buttons, a mussel is sacrificed which, in a few years, would have yielded eight to twelve times as many.

PRICES RECEIVED FOR SHELLS.

The prices which the fishermen receive for shells vary considerably, depending on the supply and demand. The size and kind of the shells also affect the price. The standard shell is the niggerhead. In 1897 the market value of this species in Muscatine ranged from 40 to 62 cents per 100 pounds. Shells were cheaper in 1898 than at any previous time, but in

February, 1898, there was a scarcity of shells at the factories, prices went up to \$18 and \$20 per ton, and many fishermen were thus induced to enter the business for the first time, and the supply was soon in excess of the demand. By July, 1898, the prices had fallen as low as 30 cents per 100 pounds for small "niggerhead" shells and 35 cents for large ones.

The ruling prices for other shells in 1897 were as follows, per 100 pounds: Sand shells, \$1.70; muckets, 30 cents; deerhorns, \$2; pocketbooks, 50 cents. The other species—bluepoints, butterflies, bullheads, hatchet-backs, etc.—are seldom sold separately, but are mixed with some of the shells named. Slough and sand shells bring \$1.50 to \$2 per 100 pounds, but few have been obtained in recent years.

When fishermen dispose of their catch without removing the meats, the prices usually range a fourth lower than for cleaned shells; thus, when "niggerheads," as usually sold, are bringing 40 cents per 100 pounds, those disposed of as they come from the water are worth only 30 cents.

It has been determined by actual count that in 100 pounds of the average size "sand shells" there are about 900 to 912 valves or half-shells. In 100 pounds of "niggerheads" of the average size now taken there are 970 to 1,000 valves. These numbers seem high when the thick and heavy shell of this species is considered, but they have been amply verified, and indicate the inordinate use of small mussels to which reference has been made. In 100 pounds of "muckets" there are 800 valves. Thus, in a ton of "niggerheads" there are 9,700 to 10,000 complete mussels represented, in a ton of "muckets" 8,000 mussels, and in a ton of "sand shells" from 9,000 to 9,120 mussels.

SHIPMENT OF MUSSELS TO OTHER STATES.

In 1897 a rather important business sprung up at Muscatine, consisting in the purchase of large quantities of shells from the local fishermen and their shipment by train to button manufacturers both east and west of the Mississippi. The business is restricted to "niggerheads" and "yellow-backs." In 1897 the fishermen received on an average 40 cents per 100 pounds for the "niggerheads" and \$1.50 per 100 pounds for the "yellow-backs." In 1898, up to July 1st, the prices were 35 cents and \$1, respectively. The shells are mostly shipped in carload lots, although a few are sent in smaller quantities packed in sacks. The amount of the shipments in the first six months of 1898, namely, about 14 carloads, was almost as large as during the entire season of 1897, when the equivalent of 14½ carloads was shipped, but the cost value of the shells was much less in 1898.

Shipments of shells are also made from other places on the Mississippi, and the business seems to be growing. In the winter of 1898-99 one buyer at Leclaire, Iowa, had a contract for 1,000 tons of shells to be shipped to New York.

Other states to which mussel shells have been sent from this part of the Mississippi are Michigan, Pennsylvania, Nebraska, New Jersey, in addition to a number of places in Iowa and Illinois not on the river.

The extent of the business at Muscatine in 1897 and 1898 to July 1st is shown in the following table:

YEAR.	KINDS OF SHELLS.	SHIPPED EAST		SHIPP'D WEST		TOTAL.	
		Pounds.	Cost.	Pounds	Cost.	Pounds.	Cost.
1897	Niggerheads	161,000	\$ 640	100,000	\$400	260,000	\$1,040
	Sand shells.....	170,000	2,550	.....	.....	170,000	2,550
	Total.....	330,000	\$1,190	100,000	\$400	430,000	\$1,900
1898 (to July 1)....	Niggerheads.....	300,000	1,050	60,000	210	360,000	1,260
	Sand shells	60,000	600	.....	.....	60,000	600
	Total	360,000	\$1,650	60,000	\$210	420,000	\$1,860

RECENT STATISTICS OF THE MUSSEL OUTPUT.

The quantities of mussel shells which were taken by the fishermen and sold to the button manufacturers in 1897 and the first six months of 1898 are shown in the following table. The total output is seen to have been 3,817 tons in 1897 and 3,950.74 tons in the first half of 1898. For these quantities the fishermen received \$43,998 and \$38,868, respectively.

The predominating importance of the niggerhead mussels (*Quadrula ebena*) is apparent, as these constituted 89 per cent of the yield in the first-named year and 94 per cent in the latter. The sand shells are second in importance, and are taken in larger quantities than all the remaining species combined.

Quantities and values of mussels sold by the mussel fishermen on the Mississippi river in 1897 and 1898.

SPECIES.	TONS.	VALUE.
1897.		
Niggerheads.....	3,414.00	\$ 34,140
Sand shells	200.00	8,900
Muckets	81 75	237
All others.....	22.25	602
Total.....	3,817.00	\$ 43,998
1898 (first six months.)		
Niggerheads	3,709.00	\$ 36,891
Sand shells	102.60	1,662
Muckets	22.25	154
All others.....	12.89	161
Total	3,950.74	\$ 38,868

In 1897 the average prices per ton received by the fishermen were \$10 for niggerheads, \$29.97 for sand shells, \$3.51 for muckets, and \$27.06 for all others, the general average price being \$11.53. In 1898 the prices were \$9.95 for niggerheads, \$16.20 for sand shells, \$5.87 for muckets, and \$12 50 for the others, with a general average of \$9.84.

THE BUTTON INDUSTRY.

ORIGIN AND PRESENT IMPORTANCE OF THE BUTTON INDUSTRY.

The manufacture of buttons from the native fresh-water shells began in the United States in 1891, the inauguration of the business being made possible by the high tariff on imported buttons imposed by the tariff bill of 1890. This levied a duty of $2\frac{1}{4}$ cents per line per gross on shell buttons and 25 per cent ad valorem. In the customs act of 1897 the tariff on pearl buttons was fixed at $1\frac{1}{4}$ cents per line per gross and 15 per cent ad valorem.

The first person to engage in this business was Mr. J. F. Boepple, who had, for many years, been similarly engaged in Hamburg, Germany. On account of an abundance of suitable mussels in its vicinity, Muscatine, Iowa, was selected as the site of the first factory and has now become an important center for button manufacturing. Other towns on the Mississippi and its tributaries from time to time established works, until in 1898 there were twenty-one communities in Iowa and Illinois in which buttons were made. A remarkable development of the business was witnessed in 1898, no less than thirty-six factories being established during the first six months of that year.

It is reported that some time before the establishment of a permanent industry at Muscatine, an effort was made to maintain a factory on the Tennessee river; this, however, was unsuccessful and was soon abandoned.

Button-making is one of the principal businesses along that part of the Mississippi between Iowa and Illinois. It gives employment to large numbers of people, who would otherwise be idle, at what are considered good wages for such labor. It also supports a very important fishery, at which many hundred persons make a living. Besides the people thus directly connected with the business, many others in more than a score of towns are benefited, including merchants, machinists, boatmen, draymen, and transportation companies.

Other important features of the Mississippi river button industry are the transformation of a hitherto useless product into a valuable commodity and placing it on the markets at reasonable prices.

NUMBER, LOCATION, AND DESCRIPTION OF THE FACTORIES.

During 1897 and 1898 (to July 1), button factories were located at the following places on the Mississippi river, in Iowa and Illinois, the lowermost point being Fort Madison, Iowa, and the uppermost Sabula, Iowa:

Iowa.—Buffalo, Clinton, Davenport, Fort Madison, Muscatine, and Sabula.

Illinois.—Albany, Andalusia, Cordova, Keithsburg, New Boston, Oquawka, and Port Byron.

The Original Fort Madison. The present site of the Morrison Manufacturing Co.

The following table shows the growth of the button industry of the section of the Mississippi in question, the number of factories established each year being given:

Years when button factories were established on the Mississippi river in Iowa and Illinois.

YEAR.	MUSCATINE, IOWA.		OTHER PLACES IN IOWA.		PLACES IN ILLINOIS.		TOTAL.	
	Complete plants.	Saw works.	Complete plants.	Saw works.	Complete plants.	Saw works.	Complete plants.	Saw works.
1891.....	1	.....	.....	.....	.....	.....	1	.....
1892.....	.....	.....	.....	.....	.....	.....	.....	.....
1893.....	.....	.....	.....	.....	.....	.....	.....	.....
1894.....	.....	.....	.....	.....	.....	.....	.....	.....
1895.....	1	.....	2	.....	.....	.....	3	.....
1896.....	.....	.....	.....	.....	.....	.....	.....	.....
1897.....	3	3	1	..	1	1	5	4
1898 (to July 1).....	.....	25	2	2	.....	7	2	24
Total	5	28	5	2	1	8	11	38

By far the larger number of these factories are small establishments at which only "rough blanks" are sawed; many of them should hardly be dignified by being called factories. In 1898 only eleven of them, located in Muscatine, Davenport, Clinton, Sabula, and Keithsburg, were plants where finished buttons were made.

At Muscatine there were eight button-making establishments in operation in 1897, six of which began work in that year. By July 1, 1898, there were thirty-three factories in operation, and in the latter half of the year a number of others were opened. At other places named there were five factories in 1897, and sixteen in the first half of 1898.

The number of factories in the various towns in operation in 1897 and 1898 are shown in the following table:

LOCATION.	1897.			1898 (TO JULY 1).		
	Complete works.	Saw works.	Total.	Complete works.	Saw works.	Total.
Muscatine, Iowa.....	5	3	8	5	28	33
Davenport, Iowa.....	25	.....	25	125	.....	125
Clinton, Iowa.....	.....	.....	.....	1	.....	1
Buffalo, Iowa .....	.....	.....	.....	.....	1	1
Ft Madison, Iowa.....	.....	.....	.....	.....	1	1
Sabula, Iowa.	1	.....	1	2	.....	2
New Boston, Ill.....	.....	.....	.....	.....	1	1
Keithsburg, Ill.....	1	1	2	1	2	3
Oquawka, Ill.....	.....	.....	.....	.....	1	1
Oordova, Ill .....	.....	.....	.....	.....	1	1
Port Byron, Ill.....	.....	.....	.....	.....	1	1
Andalusia, Ill.....	.....	.....	.....	.....	1	1
Albany, Ill.....	.....	.....	.....	.....	1	1
Total	9	4	13	11	38	49

In addition to the foregoing factories along the Mississippi in Iowa and Illinois, to which this report especially relates, in 1898 there were factories

at the following places in those states at which mussel shells from the Mississippi were utilized: Cedar Rapids, Vinton, and Charles City, Iowa, on the Cedar river; Coralville, Iowa, on the Iowa river; West Liberty, in the western part of Muscatine county, Iowa, What Cheer, Keokuk county, Iowa, Oskaloosa, Mahaska county, Iowa, and Aledo, Mercer county, Ill. Other button factories which get all or part of their raw material from the Mississippi are reported to be located in Chicago, Ill.; Cleveland and Cincinnati, Ohio; Janesville, Wis., and Omaha, Neb.

The factories at which the finished buttons are made are, as a rule, specially constructed two-story brick buildings of considerable size, having a cost value of \$5,000 to \$30,000, which sum includes land, buildings, machinery, and general equipment. A few of them occupy parts of mills or machine shops. Some of the plants at which only blanks are sawed are also in special brick or wooden buildings, but most of the "saw works" are in connection with machine shops or in improvised outbuildings of private residences; some of the smaller ones being in simple sheds. A single room is sufficient for the mere sawing of the rough blanks, but the various steps in the manufacture of the complete buttons necessitate a number of rooms and make the factory a very elaborate establishment, with the heavier machinery and rougher work on the first floor, and the different finishing processes on the upper floor.

The essential work at all the factories is done by machinery. At all the larger and many of the smaller establishments, the motive power is steam or electricity; some obtain their electric power from the city electric plant, some have independent dynamos, some have steam engines, and some use the power of adjoining machine shops or mills. A gasoline engine, of two or three horse power, furnishes the motivity for the saws at several of the small works, and foot power is also employed in a few places.

BUTTON-MAKING MACHINERY.

The business of supplying the factories with the necessary special machinery has become very important in Muscatine. The facility with which the cutting machines may be obtained, and their comparatively small cost, have been leading factors in the establishment of many of the button factories. At some large machine shops practically the entire work now consists in making and repairing apparatus used in button manufacturing and mussel fishing.

The following, taken from a Muscatine paper, illustrates the cost of the necessary machinery and the apparent profits of the machinists:

As so much has been said regarding the cost of producing pearl buttons, and so little about the cost of the necessary machinery required in their manufacture, attention is called to the following schedule, figuring on a 10-saw basis.

The cost of machinery and the price that it has been selling for allow a very handsome profit, and the business is now looked on as a money-making proposition, which is not overdone as some lines, but affords an opening for new concerns to engage in.

GRINDING MACHINE—

Casting	\$ 3.50
Steel .....	.80
Machine screws .....	.15
Machinist, 10 hours' work	2.00
Helper, 10 hours' work	1.00
Emery wheel	4.00
Fan	5.00
Automatic beveling machine	22.50

Total..... \$38.45

Two grinding machines, with automatic beveling connection..... \$ 76.90

TURNING MACHINE—

Casting	\$ 4.00
Steel .....	.60
Machine screws .....	.30
Machinist, 20 hours' work	4.00
Helper, 20 hours' work	2.00
Automatic tool sharpener and emery wheel	2.70

Total..... \$18.60

Five turning machines..... \$ 68.00

CUTTING MACHINE—

Castings	\$ 2.80
Steel .....	.80
Machine screws .....	.10
Machinist, 15 hours' work	2.00
Helper, 15 hours' work	1.50

Total

Ten cutting machines..... \$ 77.00

DRILLING MACHINE—

Casting	\$ 4.00
Steel .....	.60
Machine screws .....	.30
Machinist, 20 hours' work	4.00
Helper	2.00

Total..... \$10.90

Five drilling machines..... \$ 54.50

One sorting machine, comprising the rollers and cups..... 27.50

Shafting, pulleys, and belting 123.00

Polishing fixtures, consisting of tumblers, urns, etc..... 60.00

One sizing and grading machine... 19.50

Total outfit..... \$506.40

Outting machines that cost \$7.70 generally sell for \$38. The cost of a 10-saw plant complete, \$506.40; running expenses of manufacturer to produce this from raw material, \$60; total, \$566.40. Usual selling price for such an outfit as described above, from \$2,500 to \$3,000.

METHODS PURSUED IN THE BUTTON INDUSTRY.

The mussel shells, as purchased from the fishermen, are hauled from the boats to the factories in drays or wagons either owned or hired by the manufacturers, or in vehicles belonging to the fishermen. At the factory the shells are stored in covered sheds, the different kinds usually being kept in separate bins. Preparatory to being used, the shells are sorted into sizes by boys. Usually three sizes of "niggerheads" are recognized. Another preliminary step is the soaking of the sorted shells in barrels of fresh water for three to six days to render them less brittle. Even when only a few hours out of the river the shells become dry and brittle. It is necessary that they be used while wet, otherwise they crumble or split under the saw.

The next step is the cutting or sawing of the rough blanks. Each cutter has a pile of selected shells at hand, and, in the large factories, is kept supplied by boys. Niggerhead shells are usually held with special pliers while being cut; these grasp the circumference of the shell and enable cutters to retain it fast while holding the shell at right angles to saw. Some sawers have the hand gloved or mittened, and use no pliers or pincers. At the more extensive plants a fine jet of water plays on the shell as the saw revolves, in order to prevent the formation of dust and to keep the shell cool. The dust is very irritating to the respiratory passages and eyes of the cutters, and at some of the factories it is drawn into a tube by a current of air. The cutters in the smaller works often cover the mouth and nose with a cloth.

The saws are made of flat steel strips about two inches wide, and of various lengths corresponding to the sizes of the buttons. These strips, after being provided with fine teeth along one of the sides, are accurately bent into a cylindrical form and fitted into heavy iron holders; the latter are adjusted into a lathe in which they revolve on a horizontal axis. As the blanks are cut they pass back into the saw and holder and drop into a box beneath the saw.

From the cutting machines the blanks are taken to a weigher and recorder, who credits each man with the number of gross he cuts.

In all branches of the button industry a gross is considered as consisting of fourteen dozen, in order to make allowances for the imperfect or defective buttons that are liable to be produced at every stage of the business from the cutting of the rough blanks to the sewing of the finished buttons on cards.

By far the largest number of factories produce only rough blanks, which are sold to a local finishing plant or sent to large concerns in the east, some of which have established their own "saw works" on the Mississippi.

The next step in the making of the complete button is the dressing or grinding of the blank, to remove the skin and make an even surface. To accomplish this each blank has to be held with the finger against a revolving emery wheel.

Turning or facing is the next step. This, which is similar to the preceding, gives to the front of the button its form, including the central depression. This is followed by the drilling of two or four holes for the thread.

The button is now complete with the exception of the polishing process; this brings out the natural luster which has been lost in grinding, and which gives to these buttons their chief value. The buttons are placed in mass in large wooden kegs, known as tumblers, in which they are subjected to the action of a chemical fluid at the same time that the tumblers are revolving on a horizontal shaft. By mutual contact, combined with the effect of the fluid, the buttons become highly lustrous, while the fluid is churned into a milky froth. After being washed and dried the buttons go to the rooms where they are sorted into sizes and grades of quality, and then sewed on cards and packed in pasteboard boxes.

The daily capacity of the largest factories is 700 to 1,000 gross of finished buttons.

At Muscatine there is a small business in treating buttons to make them resemble "smoked pearl." This is a secret chemical process. The buttons so treated are usually those which exhibit defective coloration, such as yellow blotches, which would prevent their sale as first-class goods, but are otherwise perfect.

The unit of measure of the size of buttons is the line, which is one-fortieth of an inch. The buttons manufactured on the Mississippi are from twelve to forty-five lines in diameter. The largest buttons (forty to forty-five lines) are made from "niggerheads."

Following are the quantities of various sized blanks that may be cut from 100 pounds of average sized "niggerheads:" Sixteen line, twenty-eight to thirty gross; eighteen line, thirty to thirty-two gross; twenty line, twenty-four to twenty-nine gross; twenty-two line, fifteen to twenty gross; twenty-four line, twelve to fifteen gross.

Sand shells of medium size and thickness yield the following per 100 pounds: Twenty line, sixty-four gross; twenty-six line, thirty-one gross.

A medium sized "niggerhead" produces four or five eighteen line or twenty line blanks. From the large shells eight or ten blanks may be cut. Sand shells average twelve twenty line buttons. Larger sand shells yield sixteen to twenty buttons. The largest deerhorns may sometimes be cut into

twenty-five or thirty blanks; one shell is figured from which twenty-eight twenty line blanks were sawed.

THE FACTORY HANDS AND THEIR WAGES.

At the button factories on the Mississippi river in Iowa and Illinois a large number of persons are employed at wages generally regarded as good. Besides men, who have the more arduous and important duties, many boys and girls, who would otherwise be idle, are given employment.

In 1897 the employes in the button factories of Muscatine number 532; in the first half of 1898 the number had increased to 829; at the other places embraced in this report, 232 persons were employed in 1897 and 605 in the first six months of 1898, giving a total of 814 for 1897 and 1,434 for 1898. Of the latter 1,042 were males and 392 females.

In the factories in which finished buttons are made, from 30 to upward of 200 people are employed, the males and females being in about equal numbers. The factories which simply produce the "rough blanks" employ only males, the number of whom averages only 14, and only one such factory employs more than 30 persons. This is an extensive establishment in Muscatine, having 110 hands in 1898.

Taking a large Muscatine factory as an example, the following are the various capacities in which the employes are engaged:

NATURE OF EMPLOYMENT.	NO.
Cutters (all men).....	55
Dressers and grinders (all boys).....	30
Facers (girls)	30
Drillers (girls).....	32
Sorters and carders (girls)	36
Packers, etc. (girls)	15
General employes (men and boys).....	15
Managers and clerks.....	3
Total.....	216

The best wages are received by the cutters, who are always men. In the larger factories they are paid 5 to 10 cents a gross (14 dozen) for "rough blanks," according to size. Skilled men can cut from 150 to 200 gross of blanks per week, and can earn \$15, but the average is \$8 to \$10.

While the cutters are paid by the gross, the quantity is determined by weight, as too much time would be lost in actually counting the blanks. A scale of weights per gross for blanks of different sizes is established. Thus, 1 gross of 20-line sand-shell blanks weighs 1½ pounds.

The pay of grinders is 1½ to 2½ cents a gross, or from \$5 to \$7 a week.

Dressers are paid 1 to 2 cents a gross, and make about \$4.50 a week.

Facers receive 2 to 3 cents a gross, and earn \$4 to \$6 a week. They are usually young women.

Drillers are paid 1¾ to 3½ cents a gross, and make about \$5 a week.

Those who sort the buttons into lots homogeneous as to size and quality are paid by the day, and earn about \$3.75 a week.

The price paid for sewing the buttons on cards is 3 cents a gross. The girls who do this work make \$4 or \$5 a week.

Those who pack the carded buttons in boxes and the boxes in the shipping cases are paid \$5 a week.

PRICES AND MARKETS FOR BUTTONS.

It was very generally reported in 1898 that the button industry was being overdone by the establishment of numerous small factories at which rough blanks were sawed. Many persons engaged in the business without the proper equipment or experience, and the very short life of some of the factories shows that the remarkable increase in the business in 1898 was not a healthy growth. Some of the output was not of standard quality, and a general lowering of prices has been a result.

The prices received for rough blanks in 1897 and 1898 ranged from 10 to 20 cents a gross, depending on size and quality. The prices correspond rather closely with the sizes, an 18-line blank, for instance, bringing 18 cents a gross, but as a rule the prices were less than the figures representing the sizes of the blanks, being 1 to 3 cents "under the line." The average size of the rough blanks was 18 or 20 lines, and the average value per gross was 16 or 18 cents.

The wholesale prices received for the finished buttons have been a little over double those of the rough blanks of the same sizes. The average prices for complete buttons in 1897 and 1898 were 35 to 40 cents a gross. The following were the ruling prices for buttons of the stated sizes and qualities during the past year as furnished by one of the leading firms:

FIRST GRADE.		SECOND GRADE.		THIRD GRADE.	
SIZE.	Per gross.	SIZE.	Per gross.	SIZE.	Per gross.
	Cents.		Cents.		Cents.
16-line.....	55	16-line.....	50	16-line.....	40
18-line.....	60	18-line.....	55	18-line.....	45
20-line.....	65	20-line.....	60	20-line.....	50
22-line.....	70	22-line.....	65	22-line.....	55
24-line.....	75	24-line.....	70	24-line.....	60

In addition to the foregoing, a superfine button is manufactured which sells for about 15 cents per gross more than the first grade, and a cheap button, used chiefly by shirt makers, which brings from 25 to 30 cents a gross.

There was naturally some difficulty at first in putting on the market buttons made from our native fresh-water shells, but the demand was rapidly developed, as the quality and price of the buttons became known, and at present Mississippi river buttons are sold in every state and territory and in Canada. It is reported that orders have recently (1899) come from England.

UTILIZATION OF WASTE.

In sawing the blanks a large part of the shell can not be used, as it is incapable of being made into merchantable buttons. The relatively thin margin of the valves and the thick beak or umbo furnish the principal waste. The amount of unserviceable raw material is extraordinarily large, although it varies with the different species and to some extent with the different factories. In the aggregate it probably represents over 75 per cent of the weight of shells handled, and, according to the testimony of the manufacturers, with the principal mussel employed, the "niggerhead," from 85 to 93 per cent by weight, is discarded in sawing blanks, the average

loss of material being about 90 per cent. In facing, grinding, drilling, and polishing the blanks, and in defective blanks, there is a further waste, estimated at 20 to 50 per cent of the original weight of the blanks. With "sand shells," "deerhorns," and some other species, the waste is much less, amounting to probably only 50 per cent, all told.

As the accumulation of waste soon proves a nuisance, the factory owners are naturally desirous of finding some uses to which it can be put. If a market could be found for it, even at a very low price, it would be a decided boon to the industry. Many of the manufacturers feel that it has a value, but they have not been able to discover a way in which to dispose of it for any financial consideration, and practically the only use to which it has been put has been in making roads, the municipal authorities hauling it from the factories. As a rule, the manufacturers are glad to get rid of it in this way, and some of them have even paid to have it taken away.

Farmers occasionally call for small quantities of finely broken shells for use as food for chickens and turkeys, but the demand is very limited. In the opinion of the United States Department of Agriculture, the value of the shells for such a purpose is considerable, and at least one factory has introduced a special machine for reducing the shells to small fragments of uniform size, with rounded edges.

In sawing, grinding and drilling the blanks, a fine white powder results. Much of this has been saved by the button manufacturers in the hope that some use may be found for it. Small quantities have from time to time been given to farmers to experiment with as a fertilizer, but no demand for it has been created, and its value in this respect has only been conjectural. In order to obtain an authoritative opinion as to the feasibility of employing this powder as a fertilizer, the United States commissioner of fish and fisheries submitted a sample to the secretary of agriculture, who reported as follows:

The fine-ground powder, which is the refuse of the pearl button industry, transmitted to me in connection with your letter, has been examined by the chemist of the department and found to be almost pure carbonate of lime. It will prove valuable fertilizing material for stiff clay soils and for other soils deficient in lime. In the fine state of subdivision in which it exists, it could be applied directly to the soil without further preparation. I should advise persons engaging in this industry to communicate with the directors of the agricultural experiment stations of their respective states in regard to the utilization of this waste material for fertilizing purposes.

This powder without further preparation is undoubtedly excellent for polishing coarse metalware, and, if screened to remove any larger particles, may even be used for cleaning and polishing silverware, cutlery, etc.

The use of the powder in stucco work has also been suggested.

AVOIDABLE WASTE OF RAW MATERIAL.

Although, under the most favorable circumstances, there is a very large loss of material that cannot be avoided, at the same time there is a certain amount of preventable waste that, in the aggregate, must represent many thousand gross of buttons annually. This waste consists in the failure of the sawers to utilize all the available shell, and naturally varies greatly with different men and different factories.

The accompanying illustrations of shells that were picked almost at random from the discarded heaps of certain Muscatine factories clearly indicate, even to a person not versed in the button business, the unnecessary waste of material, and render scarcely needful the presentation of contrast illustrations, showing the buttons that may be cut from such shells.

From the waste heap of one manufacturer, thirteen "niggerhead" shells were picked at random; from these, twenty-six rough blanks had been cut, of which nineteen were capable of being made into salable buttons. The same shells were taken to another factory, where forty-eight additional good blanks were cut. Here was an avoidable loss of 65 per cent.

Another example of waste, and probably an extreme one, was recorded in a Muscatine paper in August, 1898. A button manufacturer picked up sixteen shells from a pile that was being spread on a road. From these thirty-one blanks had been cut. He took the discarded shells to his factory and sawed out 152 merchantable blanks. In other words, 83 per cent of the raw material had been wasted.

It is not to be supposed that the manufacturers sanction the waste of material in cutting blanks. The trouble is that the cutters are often careless or inexperienced, and cannot always be kept under the supervision of the foreman or manager. As the cutters are paid for the blanks they cut, it is decidedly to their personal advantage to get as many blanks as possible out of each shell they handle, as there is loss of time in throwing one shell away, taking a new one, and fitting it to the saw.

STATISTICS OF THE BUTTON INDUSTRY.

In the following series of tables the extent of the button industry of the Mississippi river is shown for the calendar year 1897 and the first six months of 1898. At the time of the investigation the season was not over and no complete statistics for 1898 could be obtained. It should therefore be borne in mind that the figures given for that year represent less than half the extent of the business, as a number of new factories were established after July 1st.

Outside of Muscatine, there are only from one to three factories in any one place; and in order that private interests may not be disclosed, the statistics for all the factories in each state are combined.

The 814 persons employed in 1897 are shown to have received \$157,650 in wages, while the 1,434 employed in the first half of 1898 were paid \$133,980.

The capital invested in the button manufacturing business, in buildings, machinery, equipment and land, was \$118,300 the first year and \$171,435 the second.

The cost of raw materials used in button-making was \$40,408 in 1897 and \$37,008 in 1898, these amounts representing 3,602 tons and 3,641 tons, respectively.

The manufactured products consisted of 463,200 gross of buttons and 673,200 gross of blanks in 1897, and 399,489 gross of buttons and 761,113 gross of blanks in 1898. The market value of the buttons and blanks was \$243,655 in 1897, and \$252,570 in 1898.

Persons employed and wages paid in the button industry of the Mississippi river in 1897 and 1898.

LOCALITIES.	MALE.		FEMALE.		TOTAL.		WAGES.	
	1897.	1898.	1897.	1898.	1897.	1898.	1897.	1898.
Muscatine, Iowa.	334	590	198	239	532	829	\$120,100	\$ 87,890
Other places in Iowa.....	87	168	63	123	149	291	11,800	23,190
Places in Illinois.....	105	284	28	30	133	314	25,750	22,900
Total	526	1,042	288	392	814	1,434	\$157,650	\$133,980

Capital invested in the button industry of Iowa and Illinois in 1897 and 1898.

LOCALITIES.	1897.	1898.
Muscatine, Iowa.	\$ 77,300	\$ 98,705
Other places in Iowa.....	23,000	34,000
Places in Illinois.....	18,000	38,730
Total.....	\$118,300	\$ 171,435

Quantities and values of mussel shells used in the button industry of the Mississippi river in 1897 and 1898.

LOCALITIES WHERE USED.	NIGGERHEADS.		SAND SHELLS		MUCKETS.		ALL OT'RS		TOTAL.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
1897.										
Muscatine, Iowa..	2,309.00	\$24,184	164.00	\$5,410	31.75	\$187	17.25	\$502	2,522 00	\$30,283
Other places in Ia	450.00	3,675	.....	.....	.....	.....	.....	.....	450.00	3,675
Places in Illinois.	525.00	5,250	50.00	1,000	50.00	100	5.00	100	680 00	6,450
Total.....	3,284.00	\$33,109	214 00	\$6,410	81.75	\$287	22.25	\$602	3,602.00	\$40,408
1898.										
Muscatine, Iowa..	2,316.00	24,175	20 00	547	26.25	154	10.39	149	2,273.24	25,085
Other places in Ia	741.00	5,865	2 50	15	.....	.....	.50	2	744 00	5,882
Places in Illinois.	573.00	5,591	50.00	500	.....	.....	2.00	10	624.00	6,101
Total.....	3,529.00	\$35,631	73 10	\$1,062	26.25	\$154	12.89	\$161	3,641.24	\$37,008

Quantities and values of finished buttons and rough blanks made in the button factories on the Mississippi river in 1897 and 1898.

YEARS AND LOCALITIES.	FINISHED BUTTONS.		ROUGH BLANKS.		TOTAL BUTTONS AND BLANKS.	
	Number of gross.	Value.	Number of gross.	Value.	Number of gross.	Value
1897.						
Muscatine, Iowa.....	313,200	\$ 109,370	418,200	\$ 66,385	731,400	\$ 175,655
Other places in Iowa.....	110,000	33,000	.....	.....	110,000	33,000
Places in Illinois	40,000	10,000	225,000	25,000	265,000	35,000
Total.....	463,200	\$ 152,370	673,200	\$ 91,385	1,136,400	\$ 243,655
1898.						
Muscatine, Iowa.	177,696	66,554	541,120	84,331	718,816	150,885
Other places in Iowa.....	195,793	66,767	48,000	6,040	243,793	72,808
Places in Illinois	26,000	8,000	171,993	20,878	197,993	28,878
Total.....	\$ 399,489	\$ 141,321	761,113	\$ 111,249	1,160,602	\$ 262,570

RECOMMENDATIONS.

In view of the very general desire of those pecuniarily interested in this industry that some recommendations be made by the United States Fish Commission regarding the measures that seem necessary for preventing the further depletion of the mussel beds and the consequent curtailment of all branches of the business, the following suggestions are submitted. It should, however, be understood that the perpetuation of this important industry depends wholly on the joint action of the states concerned, and that the general government and the United States Fish Commission are entirely without jurisdiction. The measures here advocated will, it is thought, be generally endorsed by the button-makers, a large majority of whom have been consulted regarding this matter; they should also commend themselves to the fishermen, who are vitally interested in having the mussel supply maintained.

First.—The gathering of small mussels should be prohibited, and a minimum legal size for each important species should be prescribed by law.

The following are the minimum sizes of the principal shells that should be gathered, the figures referring to the greatest diameter: Niggerheads, $2\frac{1}{2}$ inches; sand shells, 4 inches; muckets, 4 inches.

A niggerhead $2\frac{1}{2}$ inches long will yield from 8 to 10 buttons 18 to 20 lines wide. A sand shell 4 inches long contains from 8 to 12 buttons of the same size, and a mucket about the same number.

Second.—Immediately prior to and during their spawning season the principal species should be unmolested, and a close season should be fixed by law.

The question of a close season presents some difficulties in view of the widely different spawning times of the various species of mussels. Probably the only species that need to be considered at this time are the "niggerhead," the "mucket" and the "sand shell." The normal spawning time of the "niggerhead" in the central part of the Mississippi basin is late winter and early spring, chiefly the months of February, March and April, while the spawning time of the "mucket" and "sand shell" is the summer and early fall.

The "niggerhead" is so much more important than all of the other species combined that protective legislation addressed to it alone would prove perhaps sufficient, in view of the desirability of reducing the fishing season as little as practicable. The measure, therefore, which would probably accomplish the most good would be the establishment of a close time for "niggerheads" from January 1st, or the time of ice formation in the Mississippi, to May 1st.

Third.—Provision should be made for the prevention of damage to the beds by sewage and factory refuse.

The damage to the mussel beds in the Mississippi river in Iowa and Illinois by river pollution is to a large extent prospective, but adequate steps should be promptly taken to obviate this source of injury. The effect on animal life—especially that on the bottom—of the discharge of city and factory refuse into streams has hardly been considered by those interested in the preservation of the mussels, but it constitutes, perhaps, the most serious menace to the industry, in that the destruction wrought is inevita-

ble and complete. Mr. Simpson thus refers to the injury to mussels which is caused by antiquated methods of disposing of refuse:

The dumpings of manufactories and the sewage of cities turned into rivers is destroying not only the fish but the *Natades*. In many places below factories or cities the water of the streams is offensively foul and wholly changed in color, so that practically no kind of organic life can exist in it. Along the Potomac and Shenandoah rivers, in the vicinity of Harper's Ferry and above it, are a number of mills which grind wood into a pulp for the manufacture of paper. These throw their sawdust and waste into the streams, and down below, where the water is comparatively quiet, it settles to the bottom, forming great masses of slushy, putrid matter, which is, no doubt, destructive to fish and unions. The city of Chicago is about to turn its sewage into the Des Plaines river, from which it will be carried into the Illinois river, a stream abounding with the very finest freshwater mussels. There can be but little doubt that this great volume of filth and poison will destroy every *Natad* in both of these streams, and possibly it may exert its deleterious influence even on the Mississippi river also.

Fourth.—In order that local industries may be fostered and the catch of mussels made no larger than can be utilized by the factories in the vicinity, the matter of prohibiting the shipment of shells to distant states should be considered.

There is little doubt that the button factories now in operation in Iowa and Illinois can more than consume all the mussels that should be gathered from the section of the river under discussion. It is held by some persons having pecuniary interests at stake that the raw materials should be reserved for those who have invested their capital in permanent improvements and have established local industries, and that the continuance of the business should not be endangered by unrestricted shipment of shells to distant states and countries.

Fifth.—Button manufacturers should exercise greater care in utilizing their shells in order to reduce the waste of raw material.

This subject has already been sufficiently discussed.

The views referred to in the above article could not be obtained, therefore could not be reproduced here.

INDEX.

	PAGE.
Letter of transmittal	3
Introductory	5- 9
Recommendations—	
Guards and boiler inspection.....	11- 12
Co-operative railroading.....	13- 15
Manual training schools.....	15- 18
Labor organisations.....	18- 19
Reports by counties.....	21- 23
Statistical tables (by counties)..	23- 58
Recapitulation of entire state....	60- 65
Railroad statistics.....	67- 80
Pearl button factory... ..	81-107

TWELFTH ANNUAL REPORT

OF THE

STATE DAIRY COMMISSIONER

TO THE

GOVERNOR OF THE STATE OF IOWA.

FOR THE YEAR 1898.

B. P. NORTON,

State Dairy Commissioner.

PRINTED BY ORDER OF THE GENERAL ASSEMBLY.

DES MOINES:
F. B. CONAWAY, STATE PRINTER,
1899.

LETTER OF TRANSMITTAL.

To His Excellency, Leslie M. Shaw, Governor of Iowa:

SIR—In compliance with the law, I have the honor to submit herewith the Twelfth Annual Report of the Department of the Dairy Commissioner for the year ending October 31, 1898.

Very respectfully,

B. P. NORTON,
Dairy Commissioner.

LEVI S. GATES.

The sudden and unexpected death of the Hon. L. S. Gates, October 11, 1898, came upon his many friends as a very great shock. While speaking before a dairymen's convention on the exposition grounds at Omaha, he was stricken with complete heart failure and expired at once.

A native of Ohio, he came to Iowa in 1860 and made his home in Delaware county. He was married May 31, 1860, to Mary L. Jones, who with one son and three grandchildren mourn the loss of husband and father. His genial, generous, cheerful nature endeared him to all, and his well known integrity and excellent judgment insured for him the hearty respect of his large circle of acquaintances.

Mr. Gates was active in all that promised to benefit the community in which he lived, and came to represent the progressive and successful farmer element in his county. He was a pioneer in the creamery industry of this state. The first creamery in the state was established near his farm, and he was an enthusiastic patron of it from the first and its manager for a number of years. As president of the Delaware County Agricultural society, he did good service for the farming interests of his community and the state. He was largely instrumental in forming the State Dairymen's association in 1875, and was its president in 1888 when the state and national associations met in joint session in Manchester. As a member of the Twenty-first General Assembly, he was in charge of the bill for a law creating the office of Dairy Commissioner. His appointment to the office he had helped to create was but a fitting sequel to his long experience as a practical dairyman and successful creamery manager. He believed in the dairy business as a safe and sure road to wealth for the Iowa farmer, and he gave the best efforts of his life to the advancement of the industry. He became dairy commissioner May 1, 1898, and died in the midst of his plans for an active and aggressive campaign of work for further development of the dairy interests of the state. His "Practical Suggestions in Dairy and Creamery Management," issued in pamphlet form in connection with the dairy laws, excited extensive and very favorable comment.

A man of irreproachable character and honesty of purpose, a public official of unexcelled judgment and efficiency, a friend and counselor to all his associates, working always for the good of his community and state, an upright and exemplary citizen, his loss is not to his family alone but to the whole state.

HON. L. S. GATES.

REPORT.

PRACTICAL SUGGESTIONS IN DAIRY AND CREAMERY MANAGEMENT.

1. It is a good thing to know how to do, but it is a far better thing to do as well as we know.

2. Each dairyman should strive to produce the best and sweetest of milk, then see to it himself that it is delivered to the factory in the best possible condition.

3. Let each patron support his own creamery and do all in his power to make it successful. A successful and paying creamery business can hardly be built up without the patron and the manufacturer working in unison.

4. Own and milk good cows. If you have poor ones, send them to the butcher.

5. Never use or sell milk from diseased or unhealthy cows. It is dangerous even to feed it to the pigs.

6. Keep the cow warm and dry.

7. Feed clean, bright food in variety to produce good results.

8. Do not allow a cow to drink water you would not drink yourself.

9. Keep the cow clean by using plenty of clean, bright bedding.

10. Milk with clean, dry hands, and as quickly as possible.

11. Strain milk through cloth thick enough to retain any particles of dust or litter that may be in it.

12. It takes as much muscle to milk one hard milking cow as it does to milk four or five easy milkers. Sell her.

13. Treat cows quietly and kindly; excitement affects the quantity and quality of milk.

14. Remember when filling cans with skimmed milk at the creamery, that it is not always the other fellow that needs watching.

15. The cornstalk, either shredded or in ensilage, is one of the best feeds for the cow. Hundreds of thousands of dollars' worth of this feed are annually lost in Iowa.

16. In freezing weather, scald can covers just before starting the milk for the factory. Then cream will not stick and freeze in them. Also cover cans.

17. Wish you would write me what the cash value of skimmed milk or whey is to you as returned from the creamery or cheese factory.

CARE OF CANS.

1. Rinse cans in cold water, thoroughly wash in warm water, scald with boiling water and turn over stake in the sun.

2. Set milk in tank of cold water in summer and stir with long-handled dipper. This will eliminate animal odors and add to your test account. Also aerate morning's milk. Leave covers so that vapors can escape.

3. Important: In winter keep milk out of house and out of barn over night. Build place to keep it where no bad odors will penetrate.

4. Do not mix night and morning milk.

5. Fill cans full, so the milk will not churn on the road to the factory.

6. Put no milk in old, rusty milk cans.

7. A load of bright, clean cans, filled with clean, sweet milk, makes the creamery manager happy.

THE TEST.

1. There is no question that the Babcock principle for measuring the worth of milk for butter-making is correct when properly applied.

2. Take no milk into your weigh can that is not in good order.

3. Stir the milk thoroughly before dipping for sample.

4. See that you have an accurate machine, and that bottles used have been tested by D. C. bottle. Also important that you have D. C. pipette.

5. Be careful to have acid of standard strength.

6. Have acid and milk of the same temperature.

7. Ascertain the rapidity at which your machine should run to make accurate measurements.

8. Keep samples warm until your reading is complete.

9. As soon as the test is taken record it and post where any patron can see it.

10. The test is to teach the patron what his milk is worth for butter-making as well as to show the creamery what it can afford to pay for it.

TO THE MANAGER.

1. The butter-maker and the cheese-maker are the men who handle the product that makes the money for the people of this state; easily \$15,000,000 in the last year.

2. Give the butter-maker your support and an occasional word of encouragement. He has many and queer things to contend with, and sees too much of the bad side of human nature to thoroughly enjoy life.

3. Give him good machinery and improved apparatus, and he is very likely to take good care of it.

4. Important: Be sure you have good drainage for your creamery or cheese factory. The odor that sometimes comes from the factory prejudices the consumer against your product.

5. Pump all separated milk and butter milk into clean galvanized iron or tin tanks.

6. Wash and scald tank each day.

7. Never water separated milk to make it hold out, but rather see to it that each patron has the amount of milk to which he is entitled.

8. Separated milk is of value to the farmer when returned to him in good order.

9. The manager that treats his patrons in such a manner that he receives their confidence is on the direct road to success.

10. Treat the chronic kicker as fairly as the best patron. It is hard, but you should do it.

11. If possible secure the services of a good butter-maker. It pays.

12. Stand by your butter-maker. Allow no one to browbeat him and continually harass him. It warps his judgment and dulls his ability.

13. Put all products in neat, clean packages.

14. Ship only to responsible parties.

15. It is the part of good management to pay and balance all accounts each month.

16. Never be persuaded to pay more for milk than you receive for butter for the month, after all expenses are paid. The temptation is sometimes very great.

17. Never ask your butter or cheese-maker to favor you as patron or manager in the making of tests.

18. Lack of faith in the accuracy and honesty of the test is the greatest enemy of the creamery interests of the present time, and every creamery manager should strive to eliminate this distrust.

TO THE BUTTER-MAKER.

1. Be honest. It is the best qualification for a man in any business, as well as for a butter-maker or creamery manager.

2. Keep the person clean as well as the creamery and utensils.

3. If every butter and cheese-maker in Iowa would be scrupulously clean in his vocation, it would add much to our reputation and profit.

4. If possible, keep in touch with your patrons, so that your suggestions and requests will be readily complied with.

5. It is impossible to make good butter out of poor milk. Send it back.

6. To make fine butter requires great skill, and the operator should take pains to become thoroughly acquainted with his business.

7. Strive to keep in touch with the butter-makers of the state.

8. Make suggestions for the report of the dairy commissioner. He would like them.

It is easily possible to make an increase of 10 per cent in the next year's product of butter and cheese. That would mean an addition of \$1,500,000 to the net income of the dairymen of this state.

Iowa does and should produce the best butter in the world, and the whole world should know of it, that the world's markets may be open to us.

DAIRY LAWS OF IOWA.

CHAPTER 13.

OF THE DAIRY COMMISSIONER AND IMITATION DAIRY PRODUCTS.

SECTION 2315. Appointment—bond—powers and duties of commissioner—report. On or before the first day of April of each even numbered year, the governor shall appoint a dairy commissioner, who shall have a practical knowledge of and experience in the manufacture of dairy products, and hold his office for two years from the first day of May following his appointment, and until his successor is appointed and qualified, subject to removal by the governor for inefficiency, neglect or violation of duty. He shall give bond in the sum of ten thousand dollars, conditioned for the faithful performance of his duties, with sureties to be approved by and filed with the secretary of state. He shall keep on hand a supply of standard test tubes or bottles and milk measures or pipettes adapted for use by each milk testing machine, the manufacturers or dealers of which have filed with the dairy commissioner a certificate from the director of the Iowa agricultural experiment station, which shall certify that said milk testing machine, when properly and correctly operated, will produce accurate measurements of butter fat, and furnish to any person or corporation desiring the same for testing milk one such tube or bottle, and such milk measure or pipette for each factory, of the kind adapted for the machine operated therein, upon request therefor, certifying it to be accurate, reliable and standard, placing thereon the letters "D. C." as a permanent mark; the tubes or bottles and pipettes to be furnished at the actual cost thereof. He shall have and keep an office in the capitol, and preserve therein all correspondence, documents, records and property of the state pertaining thereto, and may, when necessary, employ a clerk at an expense of not more than seventy-five dollars per month. During his term of office he shall hold no other official position

nor any professorship in any state educational institution, and on or before the first day of November shall make annual report to the governor, which shall contain a detailed account of all his doings as commissioner, and the receipts and disbursements of his office since the preceding report, with such facts and statistics in regard to the production, manufacture and sale of dairy products, with such suggestions, as he may regard of public importance connected therewith. In the conduct of his office he shall have power to issue subpoenas for witnesses, enforce their attendance, and examine them under oath by him to be administered, such witnesses to be allowed fees as in justices' courts, to be paid by the commissioner as part of the expenses of his office, and do such other acts and things as are necessary and proper in the enforcement of the provisions of this chapter.

SEC. 2516. Imitation butter or cheese. Every article, substitute or compound, save that produced from pure milk or cream from milk of cows, made in the semblance of or designed to be used for and in the place of butter, is imitation butter; and every article, substitute or compound, save that produced from pure milk or cream from milk of cows, made in the semblance of or designed to be used for and in the place of cheese, is imitation cheese. No one shall manufacture, have in his possession, offer to sell or sell, solicit or take orders for delivery, ship, consign or forward by any common carrier, public or private, and no common carrier shall knowingly receive or transport any such imitation butter or cheese, except in the manner and subject to the regulations in this chapter provided.

SEC. 2517. Substitute for butter or cheese—regulations as to sale and use—transportation. A substitute for butter and cheese, not having a yellow color nor colored in imitation of butter and cheese as prohibited in the next section, may be manufactured, kept in possession, offered for sale, sold, shipped, consigned or forwarded by common carriers, public or private, if each tub, firkin, box or other package in which the same is kept, offered for sale, sold, shipped, consigned or forwarded shall have branded, stamped or marked on the side or top thereof, in the English language, in a durable manner, the words, "Substitute for butter," or "Substitute for cheese," as the case may be, the letters of the words to be not less than one inch in length by one-half inch in width. The defacing, erasure, canceling or removal of this brand or mark, with

intent to mislead, deceive, or violate any provision of this chapter, is prohibited. Such substitute for butter or cheese may be kept, used or served as a food or for cooking in hotels, restaurants, lunch counters, boarding houses or other places of public entertainment, only in case the proprietor or person in charge of such place shall display and keep constantly posted a card opposite each table or other place where the guests or others are served with the same, which card shall be white, at least ten by fourteen inches in size, the words, "Substitute for butter used here" or "Substitute for cheese used here," as the case may be, printed in black Roman letters of the same size as herein required to be placed upon the tubs, firkins, boxes or other package in which substitute for butter or cheese is kept, and no other words or figures shall be printed thereon. No substitute for butter or cheese shall be offered for sale in the manufacturer's original package under the name of or for true butter or cheese made from the milk or cream of cows, nor shall any substitute for butter or cheese be offered for sale or sold unless the purchaser at the time was informed thereof, and, in addition, furnished with a printed statement in the English language in prominent type that the substance sold is such substance, and giving the name and place of business of the maker. Nothing herein contained, however, shall be so construed as to prohibit the transportation of imitation butter or cheese through and across the state.

SEC. 2518. Coloring — adulteration. No one shall color with any matter whatever any substance intended as a substitute for butter or cheese, so as to cause it to resemble true dairy products, or combine any animal fat, vegetable oil or other substance with butter or cheese, or combine with any substance whatever, intended as a substitute for butter or cheese, any thing of any kind or nature for the purpose or with the effect of imparting to the compound the color of yellow butter or cheese, the product of the milk or cream from cows, or use, solicit orders for delivery, keep for sale or sell any such substance so colored and disguised as a substitute for butter or cheese; but nothing in this chapter shall be construed to prohibit the use of salt, rennet, or harmless coloring matter in making butter or cheese from such milk or cream.

SEC. 2519. Package branded. No one shall have in his possession or under his control, except for the actual consumption of himself or family, any substance designed as a substitute

for butter or cheese, unless the tub, firkin, box or package holding the same is branded or marked as in this chapter required. Any person having in his possession or under his control such substance, not so branded or marked, shall be presumed to know its true character and name.

SEC. 2520. Contracts invalid. No action shall be maintained in any of the courts of the state upon any contract or sale made in violation of or with the intent to violate any provision of this chapter by one who was knowingly a party thereto.

SEC. 2521. Search warrants—samples. Whoever shall have in possession or control any imitation butter or cheese or any substance designed to be used as a substitute for butter or cheese contrary to the provisions of this chapter, shall be held to have possession of property with intent to use it as a means of committing a public offense, and all the provisions of the chapter relating to search warrants and proceedings thereon shall apply, except the officer serving the warrant, in addition to his duties as therein required, shall deliver to the dairy commissioner, or to a person by him authorized in writing to receive the same, a perfect sample of each article seized by virtue of such warrant, for the purpose of having the same analyzed, and forthwith return to the person from whom it was taken the remainder of each article seized. If any sample is found to be imitation butter or cheese, or substance designed to be used as a substitute for butter or cheese, it shall be returned to and retained by the magistrate for the purposes contemplated in said chapter on "search warrants and proceedings thereon," but if any sample be found not imitation butter or cheese, or a substance designed to be used as a substitute therefor, the value of the same shall be paid by the dairy commissioner as a part of the expenses of his office, to the person from whom it was taken.

SEC. 2522. Milk dealers—manufacturers and packers—reports. Every city milk dealer, or every person furnishing milk or cream to such dealer, or the employe of such milk dealer, and every person or corporation, or the employe of such person or corporation, who operates a creamery, cheese or condensed milk factory, or re-works or packs butter, shall maintain his premises and utensils in a clean and hygienic condition, and shall make, upon blanks furnished by the dairy commissioner, such reports and statistics as may be required for the

purpose of compiling statistics authorized by this chapter, and such dealer, owner, operator or business manager shall make such returns and reports in the manner and in the time prescribed by the commissioner, and certify to the correctness thereof.

SEC. 2523. Milk test. Any person or corporation, or the employe of such person or corporation, who operates a creamery or cheese or condensed milk factory, and uses a chemical milk test to determine the quantity of butter fat in milk purchased, used or received, shall so use only such tests as shall be clear oil, free from any foreign substance, and produce correct measurements of butter fat, and every such person or corporation using a milk test shall procure from the dairy commissioner for each factory so operated one standard tube or bottle, and one standard measure or pipette, for testing milk, certified and marked by him as in this chapter provided, which shall be kept for inspection by the patrons and used by such person or corporation in testing or verifying test tubes or bottles and milk measures or pipettes used. In any action arising between any such operator and patron, the burden of establishing the use of reliable tests and the results therefrom, equivalent to the standard herein provided, shall be upon the operator.

SEC. 2524. Samples collected. The commissioner may appoint agents in any city having over ten thousand inhabitants to collect from each dealer, not more than four times each month, samples of milk offered for sale therein. The agent shall make an accurate test of each sample received by him, and keep a true record thereof, with the name and location of the person from whom it was obtained, and report this work in detail to the commissioner, the compensation therefor not to exceed three dollars for each day actually employed therein.

SEC. 2525. Permits. Any person or corporation who shall sell milk or cream from a wagon, depot or store, or sell or deliver milk or cream to a hotel or restaurant or boarding house, or any public place in any such city, shall be considered a city milk dealer. No such city milk dealer shall sell milk or cream from a wagon, depot or store in any such city without a written permit from the commissioner for each wagon, depot or store operated by him, for which he shall pay annually one dollar. All permits shall expire on the fourth day of July of each year, and no permit shall be issued for less than one dollar.

SEC. 2526. Inspection. He or his agent may open any can or vessel containing milk or cream offered for sale in such city, and inspect its contents and take samples therefrom for testing or analysis. And any city milk dealer, or employe of such milk dealer, or any other person who shall resist or interfere with the commissioner or his agent in the performance of his duties in executing any of the requirements of this chapter, shall be guilty of a misdemeanor and punished as provided in this chapter.

SEC. 2527. Penalties. Whoever shall violate any provision of this chapter shall be punished by a fine not exceeding five hundred dollars, or by imprisonment in the county jail not exceeding six months, or by both such fine and imprisonment, at the discretion of the court.

SEC. 2528. Compensation—expenses. The commissioner shall be allowed necessary postage, stationery and office supplies, and shall receive an annual salary of fifteen hundred dollars and necessary expenses, which shall not exceed three thousand dollars per year; such expenses to be itemized, verified by him, and, when examined and approved by the executive council, to be paid upon a warrant of the state auditor drawn upon the state treasurer. The salary of the clerk shall be paid in the same manner.

FROM CHAPTER 10, TITLE 24, CODE.

SEC. 4989. Sale of impure or skimmed milk—skimmed milk cheese—labeling. If any person shall sell, exchange, or expose for sale or exchange, or deliver or bring to another, for domestic or potable use, or to be converted into any product of human food, any unclean, impure, unhealthy, adulterated, unwholesome or skimmed milk, or milk from which has been held back what is commonly known as strippings, or milk taken from an animal having disease, sickness, ulcers, abscess or running sore, or which has been taken from an animal within fifteen days before or five days after parturition; or if any person, having cows for the purpose of producing milk or cream for sale, shall stable them in an unhealthy place or crowded manner, or shall knowingly feed them food which produces impure, unwholesome milk, or shall feed them distilled glucose or brewery waste in any state of fermentation, or upon any substance in a state of putrefaction or rottenness or of an unhealthy nature, or shall sell or offer for sale cream which

has been taken from milk the sale of which has been prohibited, or who shall sell or offer for sale, as cream, an article which shall contain less than the amount of butter fat as prescribed in this chapter; or if any person shall sell or offer for sale any cheese manufactured from skimmed milk, or from milk that is partly skimmed, without the same being plainly branded, stamped or marked on the side or top of both cheese and package, in a durable manner, in the English language, the words "skimmed milk cheese," the letters of the words to be not less than one inch in height and one-half inch in width, he shall be fined not less than twenty-five nor more than one hundred dollars, and be liable for double damages to the person or persons upon whom such frauds shall be committed; but the provisions of this section shall not apply to skimmed milk when sold as such and in the manner and subject to the regulations prescribed in this chapter.

SEC. 4990. What deemed adulterated or impure milk. For the purposes of this chapter, the addition of water or any other substance or thing to whole milk or skimmed milk or partially skimmed milk is hereby declared an adulteration, and milk which is obtained from animals fed upon waste as defined in this chapter, or upon any substance of an unhealthy nature, is hereby declared to be impure and unwholesome, and milk which is proved by any reliable method of test or analysis to contain less than twelve and one-half per cent of milk solids to the hundred pounds of milk, or than three pounds of butter fat to one hundred pounds of milk, shall be regarded as skimmed or partially skimmed milk, and every article not containing fifteen per cent or more of butter fat shall not be regarded as cream.

SEC. 4991. Enforcement. It is hereby made the duty of the dairy commissioner to enforce the provisions of the two preceding sections.

STATE OF IOWA,
OFFICE OF ATTORNEY-GENERAL, }
DES MOINES, July 7, 1898.

Hon. L. S. Gates, Dairy Commissioner, Des Moines, Iowa:

DEAR SIR—You asked for my opinion in reference to the necessity of proving the *intent* of violating the provisions of section 4989 of the code of 1897. You propound the following inquiries:

DES MOINES, Iowa, July 6, 1898.

Hon. Milton Remley, Attorney-General, Des Moines, Iowa:

DEAR SIR—I would like your opinion on the following point in the prosecution of offenders who sell milk below standard (3 per cent butter fat):

Is it necessary for the state to prove only that the offender sells or offers for sale milk below what the law requires (3 per cent butter fat)? Is it necessary for the state to prove that the one who sells or offers for sale milk below standard had an intent to deceive, or actually watered or skimmed or otherwise adulterated the milk offered for sale?

Yours respectfully,

L. S. GATES,
Dairy Commissioner.

Answering, I would say that the statute does not contemplate the necessity of proving that the party who adulterates milk, or offers the same for sale when adulterated or in any other condition forbidden by law, has an intent to violate the law.

In other words, he who offers milk for sale must know that it is pure milk. It must be in no manner "unclean, impure, unhealthy, adulterated, unwholesome or skimmed milk, or milk from which has been held back what is commonly known as 'strippings,' or milk taken from an animal having disease, sickness, ulcers, abscesses or running sores, or which has been taken from an animal within fifteen days before or five days after parturition."

Neither is it necessary to prove that the party offering milk for sale adulterated the same, or that he had knowledge that the same had been adulterated, or that he had any intent to violate the law.

See section 88, Wharton's Criminal Law, eighth edition, *Com. v. Faren*, 9 Allen, 489; *Com. v. Waite*, 11 Allen, 264; *State v. Smith*, 10 R. I., 258.

Section 4990 of the code of 1897 describes what the law contemplates to be adulterated or impure milk. It reads as follows:

"SEC. 4990. For the purposes of this chapter, the addition of water or any other substance or thing to whole milk or skimmed milk, or partially skimmed milk, is hereby declared an adulteration, and milk which is obtained from animals fed upon waste, as defined in this chapter, or upon any substance of an unhealthy nature, is hereby declared to be impure and unwholesome, and milk which is proved by any reliable method of test or analysis to contain less than twelve and one-half per cent of milk solids to the one hundred pounds of milk, or than three pounds of butter fat to one hundred pounds of milk, shall be regarded as skimmed or partially skimmed milk, and every article not containing fifteen per cent or more of butter fat shall not be regarded as cream."

Yours respectfully,

W. H. REDMAN,
Assistant Attorney-General.

The foregoing pages, containing the Practical Suggestions, prepared by the late Dairy Commissioner, L. S. Gates, together with the Dairy Laws, are printed in pamphlet form and will be sent on application, in any reasonable number, for distribution to the patrons of the creameries.

REPORTS FROM IOWA CREAMERIES.

The statistical information contained in this report, aside from the reports of railroad shipments, is obtained from the creameries and cheese factories of the state. Following is a copy of the blank sent to owners and managers. Changes in ownership and managers make it difficult for this office to make sure of reaching the proper person in each creamery. As the year for which the report is made ends May 1st, the blank must be sent at a time of year when creamery men are especially busy. It is found that an average of four notices is required to elicit returns from the creameries of this state. If the reports were sent to this office promptly so that they were received by the first of May, the annual report of the office would be in the hands of the public by the first of October. This year, work on the compilation of the report was not begun until several weeks after that date. This department needs the active co-operation of all creamery and dairy men in order to make it efficient.

The statistics for this report were collected by the late L. S. Gates during the months he was in office.

CREAMERY REPORT FROM MAY 1, 1897, TO MAY 1, 1898.

The information gained from your reports to this office is valuable and is sought for by people in every state; also by people of foreign countries. I trust you will help us to make a complete report of the great dairy interests of our state by filling the blank spaces as indicated below and returning to this office. Yours respectfully,

L. S. GATES,
Dairy Commissioner.

1. Name of creamery.....
2. Located at or near what town.....County.....
3. Name of secretary or manager.....
4. Postoffice address of secretary or manager.....County.....

5. Names of skim stations: (1).....
 Located at or near.....County.....
 (2).....
 Located at or near.....County.....
 (3).....
 Located at or near.....County.....
6. Shipping station.....County.....
 On what railroad.....
7. What is a fair valuation of creamery plant? \$..... When built?.....
8. Of your skim station plants? \$..... When built?.....
9. Is creamery operated by individual, stock company, or co-operative association?
10. If your creamery has changed ownership or been leased to present operator since May 1, 1897, give name of former owner or operator and how operated.
 Name of former owner or operator.....
 How operated.....
11. Is your creamery operated as a separator?..... Gathered cream?.....
 State number of separators in use.....
 Give name of each and whether turbine or belt.....

12. Do you pay by the test or by the hundred?.....
 Give trade name of tester.....
 Name of manufacturer of tester.....
 Number of D. C. test bottle..... Number of D. C. pipette.....
13. Did you manufacture cheese during any part of the year ending May 1, 1898?.....
14. Is cream received by the gauge or inch, by the oil test, or by the Babcock test?.....
15. How many of your patrons furnish cream from farm separators?.....
16. Was creamery operated entire year ending May 1, 1898?.....
 If not operated entire year please check the months the creamery was closed.
 1897—May, June, July, August, September, October, November, December. 1898—January, February, March, April.
17. Name of butter-maker.....
 Monthly wages paid butter-maker, \$..... No. of months employed....
 Monthly wages paid first helper, \$..... No. of months employed....
 Monthly wages paid second helper, \$..... No. of months employed....
18. Has butter-maker taken a course in dairying?..... If so, where?.....
19. State average number of persons other than patrons employed in collecting milk..... Cream.....
20. State yearly expense of collecting milk, \$..... Cream, \$.....

21. Give below the number of pounds of milk received in each month from May 1, 1897, to May 1, 1898, average test, number pounds of butter made and net value of butter made.

Pounds of milk.	Average test.	Lbs. butter made.	Net value.
May, 1897.....	\$.....
June, 1897.....
July, 1897.....
August, 1897.....
September, 1897.....
October, 1897.....
November, 1897.....
December, 1897.....
January, 1898.....
February, 1898.....
March, 1898.....
April, 1898.....
Total.....	Av.....	Total.....	Total \$.....

22. State the average yearly cost of manufacturing a pound of butter, not including delivery of milk.....cents per pound.

23. State the yearly average cost of manufacturing gathered cream butter.....cents per pound.

24. What part or per cent of your butter was furnished to patrons?.....
What part or per cent of the butter was marketed for consumption in Iowa?.....

What part or per cent of the butter was shipped to points outside of the state?.....

State what amount of butter was shipped to the following markets for the year ending May 1, 1898:

New York.....lbs. Chicago.....lbs. Boston.....lbs.
Philadelphia.....lbs. New Orleans.....lbs. Cleveland,O.....lbs.
Elgin, Ill.....lbs. Pacific coast.....lbs.
Name other cities with amounts shipped.
.....
.....

25. Give the number of persons patronizing the creamery, including the skim stations connected therewith, from May 1, 1897, to May 1, 1898, or part of year operated.....

26. State the number of cows from which your creamery, including skim stations, receives milk.....
(Please take extra pains to get information so as to answer this question.)

27. If there are any new creameries or skim stations in your county, opened since November 1, 1897, state where they are located and give proprietor or manager:

Name.....P. O. address.....
Name.....P. O. address.....
Name.....P. O. address.....

28. If there are any old creameries or skim stations reopened in the past year in your county, give location and by whom operated.

Name.....P. O. address.....
Name.....P. O. address.....

29. Are there any creameries that have ceased operating in your county since May 1, 1897?
- Name.....P. O. address.....
- Name.....P. O. address.....
30. Give the names of any creameries or skim stations in your county having burned since November 1, 1897, giving causes when known.
-
- Has the creamery or creameries been rebuilt?.....
31. Give the amount and value of all coal used in your creamery during the year ending May 1, 1898, or part of year operated.
- Number of tons..... Value, \$.....
- State what per cent or amount of this coal was domestic (mined in Iowa):
- Number of tons or per cent..... Value, \$.....
- State what per cent or amount was foreign (mined outside of Iowa)....
- If quality, cost at mine, or freight rates cause preference for foreign coal, state which; also other reasons, if any.
-
-

L. S. Gates, Dairy Commissioner:

DEAR SIR—Herewith find a report of the..... Creamery for the year ending May 1, 1898. Respectfully,

.....

(Prop., Sec. or M'gr.)

The office record number of this creamery for 1897 is.....

The office record number of this skim station for 1897 is.....

NOTE—Kindly give this your immediate attention. Stamped and addressed envelope enclosed.

FARM SEPARATORS.

Replies to the question, “How many of your patrons furnish cream from farm separators?” were received from nearly a hundred creameries. Naturally the greater part of the replies came from creameries of the gathered cream class, but quite a number are reported from separator creameries. Ninety-three creameries in forty-seven counties report 904 of the farm separators in use. The reports are from counties scattered over the state, and show that the farm separator is sufficiently widespread in Iowa for an intelligent experiment as to its usefulness. The increase or decrease of the number in use will certainly be an indication of the favor in which they are held in

the communities where they have been used. The following table shows that even now a few counties have a respectable number in use. One new creamery reports that all the patrons will furnish cream from hand separators, and the success of such a creamery will be a matter of interest to the dairymen of the state.

COUNTY.	NO. SEPARATORS
Iowa.....	150
Jefferson.....	133
Mitchell.....	122
Winneshiek.....	63
Pottawattamie.....	42
Chickasaw.....	39
Marshall.....	38
Howard.....	31
Floyd.....	27
Wright.....	26
Keokuk.....	20
Grundy.....	20
Clayton.....	18
Black Hawk.....	18
Ida.....	18
Franklin.....	14
Muscatine.....	14
Woodbury.....	11
Jackson.....	10
Miscellaneous.....	90
Total.....	904

WHAT IT COSTS TO MAKE A POUND OF BUTTER.

The following table gives the average cost of making a pound of butter in creameries of different capacities. It will be seen that there is a decrease in cost with an increase in the amount of milk handled. The fact is not so surprising as is the amount of the difference. The difference between the highest and the lowest averages is 1.21 cents which is more than 11 per cent on 19.71 cents, the average yearly price of a pound of butter. The decrease in the expense of the creamery will certainly be followed by an increased price for butter fat paid the farmer,

which increase though small in proportion will in the aggregate make a large sum. A cent a pound saved will mean nearly a million dollars on our butter product.

The creamery reporting the lowest average cost for making a pound of butter is in one of the best dairy counties of the state. This creamery reports that 400,000 pounds of butter were made at a cost of 1 cent per pound. The expense of butter-maker and assistant was reported as \$1,240, leaving \$2,760 for other expenses. The largest creamery in the state operating without skim stations reports 539,000 pounds of butter manufactured at a cost per pound of 1.2 cents. The expense of butter-maker and assistants is reported as \$2,160.

The reports of the cost of manufacturing gathered cream butter are not so many in number nor so satisfactory as the reports on separator butter. A representative report is one of a creamery making 400,000 pounds of butter at a cost, including gathering the cream, of 1.86 cents per pound.

TABLE No. 1.

Showing cost of making butter in creameries of different classes, not including cost of hauling milk or cream.

DESCRIPTION OF CREAMERIES.	No. reporting.	Average cost— cents.
IN THE SEPARATOR CLASS OF CREAMERIES.		
In creameries receiving not more than 1,250,000 pounds of milk, cost reported ranging from 1.5 cents to 7 cents per pound	43	3
In creameries receiving not more than 2,250,000 pounds of milk, cost reported ranging from 1.25 cents to 4.5 cents per pound	63	2.43
In creameries receiving not more than 3,500,000 pounds of milk, cost reported ranging from 1.25 cents to 4 cents per pound	77	2.2
In creameries receiving more than 3,500,000 pounds of milk, cost reported ranging from 1 cent to 4 cents per pound	50	1.79
IN THE GATHERED CREAM CLASS OF CREAMERIES:		
In creameries making less than 150,000 pounds of butter, cost reported ranging from 1.5 cents to 4 cents per pound	17	2.93
In creameries making more than 150,000 pounds of butter, cost reported ranging from 1.25 cents to 3.84 cents per pound	15	2.33

BUTTER PRICES.

The prediction made in last year's report that the price of butter had reached the minimum and that a recovery in prices might be looked for is shown by the following table to be well founded. The average prices for the months of the year have been uniformly higher than the prices for the corresponding

months of the previous year, except the months of February and October, 1898. The increase in price for the year is such that, notwithstanding the decrease in butter manufacture, the total net amount received for the product is not far from the total of the previous year. The increase in price will also in part account for the fact that the average number of months of operation of the creameries increased from 10.2 to 11 months, since the tendency would be to keep the creameries running when prices are good.

TABLE No. 2.
Showing average monthly price of fancy western creamery butter in New York market.

MONTH.	Twelve months ending Nov. 1, 1891.	Twelve months ending Nov. 1, 1892.	Twelve months ending Nov. 1, 1893.	Twelve months ending Nov. 1, 1894.	Twelve months ending Nov. 1, 1895.	Twelve months ending Nov. 1, 1896.	Twelve months ending Nov. 1, 1897.	Twelve months ending Nov. 1, 1898.
November.. .. .	\$.3740	\$.3590	\$.3100	\$.2790	\$.2510	\$.2330	\$.2112	\$.2325
December.....	.3912	.2887	.3112	.2840	.2440	.2500	.2250	.2390
January ....	.3812	.3075	.3387	.2563	.2519	.2266	.1900	.2040
February.....	.2842	.2975	.2875	.2700	.2394	.2000	.2050	.2049
March.....	.2730	.2665	.2925	.2350	.2670	.2185	.1900	.1937
April.....	.2694	.2609	.3112	.2387	.2000	.1650	.1880	.1980
May.....	.2230	.2125	.2455	.1700	.1785	.1672	.1530	.1580
June.....	.1825	.1944	.2131	.1831	.1794	.1550	.1500	.1687
July .....	.1800	.2210	.2160	.1850	.1770	.1505	.1500	.1687
August. ....	.2090	.2220	.2350	.2360	.1980	.1571	.1675	.1860
September.....	.2475	.2525	.2750	.2500	.2125	.1600	.1930	.2025
October....	.3000	.2687	.2941	.2540	.2294	.1850	.2290	.2335
Av.val. per lb. for each yr.	\$.2620	\$.2594	\$.2776	\$.2350	\$.2190	\$.1882	\$.1885	\$.1971

THE CREAMERIES OF IOWA.

For a number of years there has been a steady increase in the number of creameries and skim stations in this state. The past year, notwithstanding the decrease in the total amount of butter manufactured, has been no exception to the rule of creamery building. The following tables will show a gratifying increase in the number of creameries now in operation in the state, and will indicate that the creamery industry in Iowa is still making large advances. Of course the varying conditions and changing prices of butter and of cattle will cause

variations in the amount of butter made from year to year, but the continued and steady increase of the number of creameries in the state indicates a steady increase in the confidence of the people in the dairy industry as suitable to Iowa conditions and needs.

In the summary and comparisons found below, the figures show that there is a large increase in the number of creameries which pay for the milk received by the test, and a corresponding decrease in the number of those that pay by the hundred weight. In this connection it may not be out of place to say that a large and increasing number of creameries pay by the 100 pounds, but in proportion to the butter fat. All such are, of course, classed as paying by the test, and only those creameries that pay a uniform price per 100 pounds of milk are classed as paying by the hundred weight. The plan of paying by the hundred weight in proportion to the test is recommended as affording the best basis of comparison of prices paid by competing creameries. Two creameries similarly situated and both paying by test may pay slightly different amounts per pound for butter fat and the same amount per 100 pounds of milk. But only the first of these facts would appear on the face of the statements of the two. But if the statement contains the per cent of butter fat and the price per 100 pounds of milk, the patrons will have an accurate basis for comparisons of prices paid for identical tests. Of course the patron could figure all this out for himself, having given the test and the price per pound of butter fat, but he is not at all likely to do so. The plan suggested would lead to a more complete understanding on the part of the producer of the price he was really getting for his milk, and would render futile any attempt to scale the test for the purpose of deception as to the relative prices paid by competing creameries. Of course no method will avail in the face of downright dishonesty.

The summary also shows that there has been a considerable proportionate increase in the plants classed as combined plants, separator and gathered cream. This increase is almost altogether found in those counties reporting a number of farm separators. Probably there is no great increase in the amount of cream taken in by the combined plants, because the whole number of farm separators is small, but the figures indicate the tendency in that direction. If the farm separator has come to

stay, no doubt other reports in future years will show still further increase in the number of creameries operated in part as separators and in part as gathered cream plants. A real increase in the number of gathered cream plants, in which the cream is raised by the gravity system, would be a cause for discouragement, since there is nothing in the dairy business more certain than that the gravity system is far inferior to the separator system. But the reports and tables given below indicate the reverse.

The total number of creameries owned and operated by individuals remains about the same as heretofore, and the same is true in regard to the number of creameries reported as co-operative in their management. Stock companies have increased more than 100 per cent. This fact requires some explanation.

Section 1610 of the code provides that farmers' mutual co-operative creamery associations shall be exempt from the payment of the incorporation fee of \$25. The attorney-general gives the opinion that a farmers' mutual co-operative creamery association is one in which all the patrons share alike in the profits and losses of the association, and the secretary of state has, in accordance with the above opinion, required all creamery companies seeking incorporation to pay the regular incorporation fee, unless the articles of incorporation filed for record contained the provision that all the patrons of the creamery shall share the profits and losses in the same manner. It is evident that none would be exempt from the payment of the fee under this construction of the law, and hence they would be, technically, not mutual co-operative associations, but stock companies, and have been so reported. It is certain that the creameries operated on the co-operative plan have not decreased in number in the last year, though the reports on the face of them seem to indicate the fact that the only increase is in the number of stock companies. It is not possible to separate from the list those to whom the above explanation applies, and they are all tabulated as they are given in the reports to this office.

Under the head of new creameries, all additions to the list of last year are embraced—strictly new plants, old ones reopened and creameries that have heretofore escaped listing. Comparisons with previous years show a steady and almost uniform rate of increase; yet every report marks the closing of a large number of creameries. The practical difficulties in the way of running a small creamery no doubt are responsible for the num-

ber of plants closed. The successful creamery requires the hearty co-operation of all its patrons to insure its profitability, as well as to produce a good grade of butter. But, despite the number of unsuccessful investments in creamery enterprises, every year shows a net increase of nearly one to a county throughout the state.

NUMBER AND KINDS OF CREAMERIES AND SKIM STATIONS.

	1898.	1897.
Total creameries and skim stations.....	954	891
Number reporting	940	890
Number owned and operated by individuals	510	504
Number owned and operated on the co-operative plan	342	349
Number owned and operated by stock companies.....	88	37

MANNER OF OPERATION.

Number reporting	914	891
Operated as separator.....	788	771
Gathered cream	66	68
Separator and gathered cream.....	60	52

MANNER OF PAYMENT.

Number reporting	893	820
By the test.....	746	698
By the hundred	107	122
New creameries and all additions to the list.....	133	137
Creameries closed for any reason.....	53	55

TABLE No. 3.

Statistical report of number of creameries and skim stations.

TABLE No. 3—CONTINUED.

COUNTIES.	OWNERSHIP— INDIVIDUAL, CO-OPERATIVE OR STOCK COMPANY.				HOW OPERATED.				RECEIVING MILK— BY TEST OR BY CWT			NEW CREAM- ERIES AND SKIM STA., AND PLANTS CL'S'D				
	Total number of creameries and skim stations.	No reporting.	Individual.	Co-operative.	Stock company.	No. reporting.	Separator.	Gathered cream.	Combined plant.	No. reporting.	By test.	By cwt.	New creameries.	New skim stations.	Total new cream- eries and skim stations	Plants closed or burned.
Jefferson	9	9	6	1	2	9	9	1	1	9	9	1	1	1	1	1
Johnson	3	3	3	1	1	3	3	1	1	3	3	1	1	1	1	1
Jones	30	30	23	6	1	30	30	1	1	30	30	1	2	23	4	1
Keokuk	3	3	1	1	2	3	3	1	1	3	3	1	1	1	1	2
Kossuth	21	21	1	19	1	20	20	1	1	20	20	1	1	1	1	1
Lee	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Linn	30	30	18	3	9	30	28	2	2	30	20	9	1	2	3	1
Louisa	3	3	3	1	1	3	3	1	1	3	3	1	1	1	1	1
Lucas	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Lyon	4	4	3	1	1	3	3	1	1	3	2	1	1	1	1	1
Madison	4	4	3	1	1	3	3	1	1	3	3	1	1	1	2	2
Mahaska	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Marion	3	3	3	1	1	3	1	2	1	1	1	1	1	1	1	2
Marshall	11	11	7	4	1	10	8	2	1	9	9	1	2	2	4	1
Mills	4	4	4	1	1	4	1	3	1	1	1	1	1	1	1	1
Mitchell	9	9	1	9	1	9	1	8	2	4	3	1	1	1	1	1
Monona	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Monroe	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Montgomery	3	3	3	1	1	3	3	1	1	3	3	1	1	1	1	1
Muscatine	5	5	5	1	1	5	5	1	1	5	1	4	1	1	1	1
O'Brien	6	6	4	2	2	6	5	1	1	5	3	2	2	1	2	1
Osceola	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3
Page	6	6	2	2	2	6	6	1	1	6	4	2	1	1	1	1
Palo Alto	17	17	16	1	1	17	17	1	1	17	17	1	2	1	2	1
Plymouth	11	10	9	1	1	9	8	1	1	9	8	1	1	1	1	1
Pocahontas	9	8	8	1	1	9	9	1	1	9	8	1	1	1	1	1
Polk	8	8	5	1	2	8	7	1	1	8	8	1	1	1	2	1
Pottawattamie	5	5	2	1	2	5	4	1	1	4	3	1	1	1	1	1
Poweshiek	6	6	6	1	1	6	4	2	1	5	5	1	1	1	2	1
Ringgold	3	3	2	1	1	3	2	1	1	3	3	1	1	1	1	1
Sac	13	13	11	1	1	13	13	1	1	13	9	4	1	1	1	1
Scott	3	3	3	1	1	3	2	1	1	3	3	1	1	1	1	1
Shelby	8	8	4	4	1	5	5	1	1	5	3	2	3	1	3	1
Sioux	8	8	4	2	2	8	8	1	1	8	8	1	1	1	1	1
Story	15	15	5	8	1	14	14	1	1	14	14	1	1	1	1	2
Tama	11	11	9	1	1	10	7	2	1	10	10	1	2	1	3	1
Taylor	6	6	4	1	1	6	6	1	1	6	5	1	1	1	1	1
Union	14	13	8	1	4	14	14	1	1	14	14	1	1	1	1	1
Van Buren	4	4	3	1	1	4	2	1	1	3	3	1	1	1	1	1
Wapello	4	4	4	1	1	3	3	1	1	3	3	1	1	1	1	2
Warren	5	5	5	1	1	5	5	1	1	5	5	1	1	1	2	1
Washington	6	6	5	1	1	5	3	2	1	5	5	1	1	1	1	1
Wayne	8	7	7	1	1	7	6	1	1	7	7	1	1	1	2	1
Webster	9	9	8	1	1	8	4	2	1	6	5	1	8	1	3	1
Winnebago	15	15	15	1	1	13	13	1	1	13	13	1	1	1	2	1
Winneshiek	17	17	6	5	6	17	11	5	1	15	15	4	1	1	4	1
Woodbury	9	9	5	3	1	7	7	1	1	7	5	2	3	1	3	1
Worth	9	9	1	8	1	8	6	1	1	8	8	1	1	1	1	1
Wright	11	11	7	4	1	11	10	1	1	11	11	1	1	1	1	1
The state	954	941	510	342	88	914	788	66	60	893	746	107	90	43	123	53

The creamery at the Iowa Agricultural college is the property of the state, and hence is not enumerated above. Other subtractions from the list, 17.

BUTTER-MAKERS AND OTHER EMPLOYES.

The returns from nearly five hundred creameries make the basis of the estimate of the average wages paid butter-makers in this state, and it is gratifying to note a considerable increase in the average monthly wages paid. An increase of \$3.59 over last year's report, together with the fact that the average number of months employed also increased .8 of a month, marks a substantial advance in the remuneration of the men who make our butter.

A large number of creameries make a note of the fact that nearly all the hauling of milk is done by the patrons of the creamery. The expense of hauling the milk that will make a pound of butter will not vary much from 2.25 cents, but the conditions are so different in the several localities that no attempt has been made to estimate what the average cost would be for the state.

	1898.	1897.
Average monthly wages of butter-makers.....	\$53 63	\$50.04
Average number of months employed	11	10.2

TABLE NO. 4.
Butter-makers and other employees.

COUNTY.	BUTTER-MAKERS' AND ASSISTANTS' WAGES.										EMPLOYEE EXPENSE.		
	No. creameries.	Butter-makers reported.	Total paid but-ter-makers.	Average wages of assistants.	Total paid assistants.	1.	2.	3.	4.	5.	Total employees.	Total paid em- ployes of all kinds.	EMPLOYEE EXPENSE.
The State.....	708	479	\$ 394,151	\$38.30	\$ 38,293	305	1,457	\$ 405,014	53	338	\$ 128,061	\$ 878,815	
Adair.....	6	3	1,800	39.00	1,576	3	17	4,113	..	..	..	7,459	
Adams.....	2	1	330	30.00	180	..	..	..	..	..	..	1,178	
Allamakee.....	9	5	5,650	26.35	1,376	3	23	15,000	3	33	9,795	32,730	
Appanoose.....	..	..	..	..	..	..	..	..	..	..	..	..
Audubon.....	9	6	5,413	38.00	430	4	30	10,386	..	..	..	16,713	
Benton.....	11	5	4,931	32.50	465	3	30	3,797	1	6	900	7,743	
Black Hawk.....	13	13	8,638	34.00	1,570	5	39	13,120	..	..	..	39,335	
Boone.....	6	3	1,500	29.33	980	3	7	1,540	1	3	535	4,580	
Bremer.....	25	20	14,995	16.00	915	5	66	4,332	1	6	1,490	22,185	
Buchanan.....	19	7	5,430	35.00	2,400	4	36	14,393	..	..	..	33,833	
Buena Vista.....	8	5	3,540	39.00	1,515	3	30	7,304	..	..	..	11,539	
Butler.....	23	15	9,650	35.10	2,090	9	13	5,473	1	1	385	14,437	
Calhoun.....	9	5	3,390	50.00	800	..	..	..	..	..	..	4,180	
Carroll.....	11	3	1,960	30.00	834	3	20	4,435	..	..	..	7,399	
Cass.....	1	1	780	30.00	690	..	..	..	..	..	..	1,380	
Cedar.....	4	4	1,360	25.00	315	1	3	..	1	6	3,080	5,335	

TABLE NO. 4—CONTINUED.

COUNTIES.	BUTTER-MAKERS' AND ASSISTANTS' WAGES.				EXPENSE HAULING MILK.				EXPENSE HAULING CREAM.			EMPLOYEES' EXPENSE.		
	No. creameries.	Butter-makers reported.	Average wages per month.	No. of assistants employed.	Average wages of assistants.	Total paid assistants.	Creameries re-reporting.	No. employed not patrons.	Total paid for hauling milk.	Creameries re-reporting.	No. employed.	Total paid for hauling cream.	Total employees.	Total paid employees of all kinds.
Barro Gordo.	11	9	46.00	3	22.50	615	2	3	3,100	1	3	1,100	15	5,047
Cherokee.	7	8	58.00	11	23.50	3,123	0	13	2,354				13	4,004
Chickasaw.	19	15	53.00	1	20.00	200	0	70	24,110				90	20,073
Clarke.	2	1	35.00	1	20.00	200							3	200
Clay.	9	9	53.00	10	22.50	2,300	3	10	4,000				14	4,800
Clayton.	19	17	54.15	20	22.50	2,397	13	186	46,026	3	4	3,007	160	61,369
Clinton.	9	8	41.00	2	24.00	676							5	2,076
Crawford.	0	0		1,000										
Dallas.	0	0	44.00	2	22.75	510	0	24	7,280				13	10,700
Davis.	3	3	40.00	3	22.75	515						300	8	2,175
Decatur.	3	3		900										
Delaware.	21	16	57.21	7	30.00	1,503	0	40	13,053				61	23,768
Des Moines.	4	3	55.00	1	25.00	75	3	20	4,730				24	1,145
Dickinson.	20	18	49.00	4	30.00	708	7	63	10,000				31	27,033
Dubuque.	0	0	57.00	1	15.00	150							4	2,371
Emmet.	0	0		2,041										
Fayette.	23	17	57.40	11,000	24.00	2,686	11	106	27,116				120	63,323
Floyd.	7	4	59.75	2,830	22.00	2,304	3	13	3,300				24	3,874
Franklin.	13	8	47.00	4,500	22.00	1,300	2	34	10,073	1	5	3,000	46	16,448
Fremont.	0	0												
Greene.	8	6	45.23	3,364	24.00	603	3	16	2,027				25	7,263
Grundy.	19	9	44.10	4,610	26.25	2,103	6	41	12,075				97	20,741
Guthrie.	6	3	43.50	257			1	5	1,500				7	2,457
Hamilton.	10	6	55.00	2,500	22.50	2,105	4	23	2,161				40	12,615
Hancock.	4	0	47.50	2,145				16	2,180			700	24	2,096
Hardin.	13	9	50.81	5,070	31.75	2,613	4	30	2,434	1	5	1,753	61	13,039
Harrison.	4	2	57.50	1,800	22.00	403	3	19	2,450				20	4,350
Henry.	3	3			22.00	579	3	14	2,590				15	4,129

Howard.....	8	54.63	4,944	3	24.30	723	1	8	2,000	3	25	7,800	44	15,526
Humboldt	8	53.50	4,620	3	20.00	525	.....	.....	.....	.....	.....	.....	11	5,215
Ida.....	5	40.00	480	1	20.00	260	1	5	1,550	.....	.....	.....	7	2,390
W Iowa.....	6	50.00	1,200	2	23.50	540	.....	.....	.....	.....	14	5,450	18	7,190
Jackson.....	13	48.00	5,205	5	28.00	1,200	2	8	1,780	3	12	4,200	35	12,385
Jasper.....	8	43.50	2,544	3	29.00	642	4	23	7,490	.....	.....	.....	36	10,676
Jefferson.....	8	45.70	3,700	1	15.00	90	3	24	4,150	.....	.....	.....	33	7,940
Johnson.....	4	35.00	420	.....	.....	.....	1	3	660	1	8	720	7	1,800
Jones.....	18	54.10	5,812	3	28.75	405	.....	.....	.....	.....	.....	.....	12	6,217
Keokuk.....	3	54.00	1,920	2	28.50	474	1	12	4,500	1	14	3,000	31	9,894
Kossuth.....	21	54.80	9,866	9	27.54	2,008	.....	.....	.....	.....	.....	.....	24	11,874
Lee.....	1	.....	.....	.....	26.00	1,335	6	25	4,663	.....	.....	.....	43	12,337
Linu.....	25	43.70	6,330	5	.....	.....	.....	.....	.....	2	7	1,400	8	2,000
Louisa	3	50.00	600	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lucas.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lyon	4	50.00	1,200	1	35.00	140	.....	.....	.....	.....	.....	.....	3	1,340
Madison.....	3	.....	.....	.....	29.00	507	.....	.....	.....	1	12	5,000	15	5,987
Mahaska	1	40.00	480	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Marion.....	3	.....	.....	.....	19.00	322	1	9	1,904	2	17	7,914	23	88,790
Marshall.....	6	53.80	2,580	3	30.00	1,000	2	4	1,869	1	5	2,800	13	6,769
Mills	3	50.00	600	3	25.00	795	.....	.....	.....	6	27	13,292	43	19,855
Mitchell.....	9	52.10	5,273	6	.....	.....	1	3	600	.....	.....	.....	4	1,330
Monona	1	60.00	720	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Monroe .....	.....	.....	.....	.....	30.00	180	.....	.....	.....	.....	.....	.....	.....	.....
Montgomery.....	1	75.00	900	1	35.00	420	3	18	3,040	3	11	4,600	2	1,090
Muscatine.....	3	46.66	1,680	1	.....	.....	.....	.....	.....	.....	.....	.....	33	9,740
O'Brien.....	6	67.50	1,260	1	15.00	180	1	8	1,247	.....	.....	.....	11	2,687
Osceola	1	50.00	400	.....	.....	.....	1	5	903	.....	.....	.....	6	1,303
Page.....	6	55.00	1,320	1	15.00	180	2	9	2,223	.....	.....	.....	12	3,623
Palo Alto.....	17	54.53	8,584	11	22.54	2,351	2	5	2,214	.....	.....	.....	31	13,149
Plymouth.....	11	55.00	5,030	4	19.50	121	5	18	4,887	.....	.....	.....	30	10,540
Pocahontas.....	8	53.75	2,580	2	22.50	300	3	25	5,927	.....	.....	.....	31	8,807
Polk.....	5	53.75	2,570	3	37.50	700	3	11	2,100	.....	.....	.....	17	5,470
Pottawattamie.....	5	52.50	2,520	3	33.33	740	2	13	3,373	1	15	7,000	35	13,633
Poweshiek.....	5	45.00	510	.....	.....	.....	.....	.....	.....	1	7	2,000	8	2,510
Ringgold.....	2	50.00	1,200	1	20.00	100	1	2	700	1	3	1,500	8	3,500
Sac.....	13	47.00	2,820	8	28.00	2,643	.....	.....	.....	.....	.....	.....	13	5,463
Scott.....	3	47.50	600	.....	.....	.....	.....	.....	.....	1	2	350	4	950
Shelby.....	7	37.50	2,100	1	15.00	180	2	14	4,285	.....	.....	.....	17	6,565
Sioux.....	8	54.28	4,285	2	27.50	450	4	21	4,988	.....	.....	.....	30	9,723
Story.....	13	61.67	5,920	10	20.00	2,910	6	43	13,493	.....	.....	.....	61	23,223

TABLE NO. 4—CONTINUED.

COUNTIES.	BUTTER-MAKERS' AND ASSISTANTS' WAGES.						EXPENSE HAULING MILK.				EXPENSE HAULING CREAM.			EMPLOYEES' EXPENSE.	
	No. creameries.	Butter-makers reported.	Average wages per month.	Total paid butter-makers.	No. of assistants employed.	Average wages of assistants.	Total paid assistants.	Creameries re-porting.	No. employed not patrons.	Total paid for hauling milk.	Creameries re-porting.	No. employed.	Total paid for hauling cream.	Total employees.	Total paid employees of all kinds.
Tama.....	8	3	41.67	1,250	1	30.00	210	3	20	4,400	.....	.....	.....	4	1,480
Taylor.....	5	4	51.25	2,480	3	30.00	540	.....	.....	.....	.....	.....	.....	27	7,400
Union.....	5	4	50.00	2,400	9	30.30	2,970	.....	.....	.....	.....	.....	.....	13	5,370
Van Buren	3	1	40.00	480	1	33.00	330	1	1	316	.....	.....	.....	8	1,126
Wapello.....	4	1	50.00	300	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	300
Warren.....	2	.....	.....	.....	1	33.00	330	2	15	2,500	.....	.....	.....	16	2,890
Washington.....	6	3	41.50	1,494	3	25.00	740	1	6	2,350	1	7	3,200	19	7,784
Wayne.....	4	2	50.00	1,100	2	33.50	650	2	43	6,431	.....	.....	.....	47	8,181
Webster.....	9	2	45.00	629	.....	.....	.....	1	6	1,400	2	9	2,400	17	4,420
Winnebago.....	8	6	58.33	4,000	5	21.40	1,189	.....	.....	.....	.....	.....	.....	11	5,189
Winnechele.....	17	12	53.25	6,534	2	25.00	600	2	8	556	9	52	25,930	74	33,620
Woodbury.....	9	3	43.33	1,245	.....	.....	.....	2	8	670	2	10	2,768	21	4,883
Worth.....	8	6	57.92	4,280	2	17.50	305	.....	.....	.....	.....	.....	.....	8	4,535
Wright.....	10	4	48.75	1,990	2	23.00	500	4	18	4,607	.....	.....	.....	24	7,097
The State.....	793	479	353.63	\$ 294,151	280	\$20.20	\$ 53,392	205	1,457	\$ 405,014	58	333	\$ 126,061	2,539	\$ 878,618

A small decrease in the average value of the creameries of the state will be noted in the following summary and table. This is accounted for, as in previous reports, on the assumption that creamery managers and owners are coming more and more to report the value of their plants, not at first cost, but as worth the amount that it would take to replace them. The reports received range from \$2,000 to \$10,000, but most of the values of the creameries reported are very near the average given, \$3,024. The day of exorbitant prices for creamery building and for creamery machinery is gone, and it is confidently expected that future reports will still further reduce the average value of creameries. A reduction in the amount of capital necessary to start a creamery will certainly result in a further increase of the number of creameries.

The increase in the average number of months the creameries were operated is another gratifying feature of the following table.

Attention is called to the increase in the number of patrons per creamery, and the fact that the increase reported will very nearly account for the increase in the whole number of patrons reported.

The decrease in the average number of cows per patron and the very decided decrease in the total number of cows reported, while not encouraging, is in accordance with the other known facts in regard to the creamery output for the past year. The decrease in the net butter shipments for the last year amounts to 6,088,744 pounds, which is very nearly in the proportion of the decrease in the aggregate number of cows. No doubt the fact that young stock has for a considerable time been very high in price, and butter in the same time been correspondingly low, has induced some to raise more stock and make less butter. And the fact that butter has reached a higher price for the year past will, no doubt, cause an increase in the number of cows milked and the amount of butter made.

	1898.	1897.
Average value of creameries.....	\$ 3,024	\$ 3,103
Average value of skim stations.....	1,510	1,335
Total value of creameries and skim stations.....	2,641,379	2,586,149
Average months creameries were operated.....	11	10.2
Average patrons per creamery.....	116	113
Total number of patrons of creameries.....	91,998	87,349
Average number of cows per patron.....	7	+
Average number of cows per creamery.....	798	964
Total number of cows.....	632,814	745,17

TABLE NO. 5.
Value of plants, time operated, number of patrons and number of cows.

COUNTIES.	VALUE OF PLANTS.						TIME OP- ERATED.		PATRONS.				COWS.			
	No. of cream- eries.	No. reporting.	Value of cream- eries reported.	No. of skim sta- tions.	No. reporting.	Value of skim stations re- ported.	Total value of both.	No. reporting.	A. V. No. months operated.	No. creameries reporting.	Total No. of patrons.	A. V. No. of pa- trons per creamery.	No. creameries reporting.	No. of cows per patron.	T. tal No. of cows reported.	A. V. No. of cows per creamery.
The state.....	793	562	\$1,692,630	161	59	\$90,100	\$1,789,750	575	11.2	504	59654	116	374	*7	298,392	798
Adair.....	5	3	14,800	7	4	6,200	21,000	3	11.6	3	837	279	1	10	1,800	1,800
Adams.....	2	1	4,000	5	2	2,000	7,000	1	12.0	6	1,265	216	5	5	6,697	1,339
Allamakee.....	9	6	18,600	...	...	...	18,600	6	12.0	...	...	...	...	...	...	...
Appanoose.....	...	...	...	...	...	...	...	...	...	6	...	...	...	...	...	...
Audubon.....	9	8	24,000	2	...	...	24,000	7	8.8	6	725	121	4	7	3,559	889
Benton.....	11	8	24,800	2	1	1,500	26,100	9	10.2	6	567	94	6	8	4,565	761
Black Hawk.....	18	14	41,100	...	...	...	41,100	13	11.2	13	1,253	104	12	9	11,054	921
Boone.....	6	4	12,000	2	1	1,000	13,000	4	12.0	3	385	128	1	9	1,412	1,412
Bremer.....	26	23	69,900	...	...	...	69,900	23	12.0	21	1,594	76	18	9	11,343	797
Buchanan.....	16	10	36,500	1	1	2,500	39,000	9	11.8	9	1,437	159	6	8	6,670	1,112
Buena Vista.....	8	8	25,800	1	1	2,000	27,800	8	10.7	7	899	124	3	9	3,343	1,114
Butler.....	22	17	49,500	...	...	...	49,500	17	11.5	15	1,326	88	13	7	6,938	633
Calhoun.....	8	6	15,400	3	...	...	15,400	6	12.0	6	467	78	3	8	1,225	408
Carroll.....	11	5	18,000	2	1	2,000	20,000	5	12.0	4	415	104	1	10	1,000	1,000
Cass.....	1	1	8,000	6	5	8,000	16,000	1	11.0	1	700	700	...	...	...	...
Cedar.....	6	4	10,200	4	3	3,600	13,800	4	10.0	3	639	213	3	4	2,840	947
Cerro Gordo.....	11	9	24,000	1	2	2,500	26,500	10	11.6	10	945	94	5	7	2,195	439
Cherokee.....	7	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...
Chickasaw.....	19	16	52,000	1	...	...	52,000	16	11.8	14	1,639	117	11	...	10,800	982
Clarke.....	2	1	8,000	3	3	3,000	6,000	1	12.0	1	875	875	1	3	1,133	1,132
Clay.....	9	4	11,700	...	...	...	11,700	4	12.0	3	263	88	2	6	1,250	625
Clayton.....	19	19	64,900	1	...	...	64,900	19	11.9	18	2,212	123	15	7	14,270	951
Clinton.....	9	...	...	6	...	...	...	8	9.0	8	485	61	8	8	8,175	397
Crawford.....	6	4	12,000	3	1	1,000	14,000	4	12.0	3	185	63	2	8	633	317

Dallas	5	5	17,200	6	1	1,300	18,600	5	11.6	5	694	195	3	8	2,150	717
Davis	3	3	8,000	1	1	1,000	9,000	3	12.0	1	50	50	1	5	250	250
Decatur	31	17	49,000	1	...	...	49,000	17	12.0	...	1,181	69	13	9	9,994	769
Delaware	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Des Moines	4	4	12,200	...	...	...	12,200	3	12.0	...	459	115	3	8	2,080	1,080
Dickinson	23	19	49,150	...	...	...	49,150	19	11.3	13	909	75	14	9	9,317	658
Dubuque	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Emmet	6	3	8,000	...	...	...	8,000	3	12.0	3	271	90	2	7	1,400	730
Fayette	23	16	57,000	1	1	2,500	59,500	16	11.9	14	1,812	129	11	7	12,579	1,144
Floyd	7	5	12,800	...	...	...	12,800	5	12.0	5	700	140	5	6	4,710	943
Franklin	10	9	31,850	1	...	...	31,850	10	12.0	9	1,111	123	7	5	4,647	664
Fremont	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Greene	8	6	18,700	1	1	1,300	20,000	6	12.0	5	536	107	2	4	850	425
Grundy	16	12	36,700	3	...	...	36,700	12	10.0	13	949	79	12	9	8,576	740
Guthrie	5	2	8,500	7	1	1,500	10,000	2	11.0	2	175	83	1	7	850	850
Hamilton	10	7	24,600	2	1	1,500	26,100	7	11.0	5	552	110	5	7	3,477	693
Hancock	9	6	16,300	2	...	...	16,300	6	9.3	6	496	51	4	5	1,850	4.0
Hardin	12	10	32,500	3	1	2,000	35,500	10	11.6	8	1,430	179	6	5	6,640	1,106
Harrison	4	3	12,300	...	...	...	12,300	3	10.6	2	235	118	1	5	631	621
Henry	3	3	7,100	1	1	1,500	8,600	3	12.0	3	169	85	2	3	453	217
Howard	8	7	19,000	1	1	1,200	20,200	7	11.1	5	902	150	4	5	3,250	837
Humboldt	8	8	25,900	1	...	...	25,900	8	10.7	8	702	83	5	6	2,670	534
Ida	5	4	12,000	...	...	...	12,000	4	12.0	3	440	147	3	5	2,050	683
Iowa	6	4	15,200	...	...	...	15,200	4	11.5	1	400	400	1	12	500	500
Jackson	12	11	27,300	7	2	2,700	30,000	12	10.4	9	894	99	5	7	3,559	712
Jasper	8	6	12,900	...	...	...	12,900	5	12.0	6	613	123	...	...	...	...
Jefferson	8	7	17,800	1	1	2,000	19,800	7	10.5	4	442	110	4	6	2,435	609
Johnson	4	2	2,500	4	...	...	2,500	2	12.0	1	80	80	...	...	...	...
Jones	18	12	35,300	12	1	1,300	36,600	14	10.7	13	1,331	106	10	10	5,783	578
Keokuk	3	3	12,000	...	...	...	12,000	3	12.0	3	380	127	2	4	1,800	650
Kossuth	21	15	45,500	...	...	...	45,500	15	12.0	14	1,119	80	13	10	10,164	782
Lee	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Linn	25	18	41,750	5	1	1,200	42,950	18	11.5	16	830	51	9	10	4,921	547
Louisa	3	2	2,000	...	...	...	2,000	2	12.0	2	240	130	1	5	750	750
Lucas	1	1	2,500	...	...	...	2,500	1	12.0	1	100	100	1	10	1,000	1,000
Lyon	4	2	4,800	...	...	...	4,800	2	12.0	2	155	78	2	6	900	450
Madison	3	1	1,500	1	...	...	1,500	1	9.0	1	75	75	...	...	...	...
Mahaska	1	1	5,000	...	...	...	5,000	1	12.0	1	400	400	1	5	2,000	2,000
Marion	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Marshall	6	3	12,000	5	...	...	12,000	3	12.0	3	740	247	3	7	5,200	1,733
Mills	3	3	5,500	1	...	...	5,500	3	9.0	3	725	343	2	5	3,730	1,865

* Nearly.

TABLE NO. 5—CONTINUED.

COUNTIES.	VALUE OF PLANTS.						TIME CP- HEATED.		PATRONS.				COWS.			
	No of cream- eries.	No. reporting.	Value of cream- eries reported.	No. of skim sta- tions.	No. reporting.	Value of skim stations re- ported.	Total value of both.	No. reporting.	Av. No. months operated.	No. creameries reporting.	Total No. of patrons.	Av. No. of pa- trons per creamery.	No. creameries reporting.	No. of cows per patron.	Total No. of cows reported.	Av. No. of cows per creamery.
Mitchell.....	9	8	14,800	...	...	...	14,800	8	12.0	8	1,836	229	9	7	7,247	1,449
Monona.....	1	1	4,000	...	...	...	4,000	1	12.0	1	82	82	1	4	340	340
Monroe.....	1	1	2,000	...	...	...	2,000	1	12.0	1	80	80	1	4	300	300
Montgomery.....	1	1	2,000	2	...	...	2,000	1	12.0	1	100	100	1	6	600	600
Muscatine.....	3	3	9,500	2	1	1,000	10,500	3	12.0	2	485	242	3	6	3,130	1,043
O'Brien.....	6	3	12,800	...	...	...	12,800	3	10.0	2	99	49	2	11	1,150	575
Osceola.....	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Page.....	6	3	9,000	...	...	...	9,000	4	9.7	3	344	115	2	4	1,080	530
Palo Alto.....	17	14	42,600	...	...	...	42,600	14	11.7	14	1,239	89	9	9	7,574	842
Plymouth.....	11	8	23,200	...	...	...	23,200	8	11.6	8	727	91	5	7	3,256	651
Pocahontas.....	8	6	15,200	1	...	...	15,200	6	11.6	5	676	185	3	6	2,250	750
Polk.....	5	4	12,500	3	1	1,000	13,500	4	10.0	4	330	98	2	7	950	475
Pottawattamie.....	5	4	11,500	...	...	...	11,500	4	12.0	3	810	270	3	7	5,673	1,891
Poweshiek.....	5	2	4,500	1	...	...	4,500	2	12.0	1	65	65	1	6	400	400
Ringgold.....	2	2	4,800	1	...	...	4,800	2	11.0	1	78	78	...	...	...	...
Sac.....	13	9	23,000	...	...	...	23,000	9	12.0	9	695	77	7	7	4,075	532
Scott.....	3	2	6,000	...	...	...	6,000	2	6.0	2	105	53	2	7	705	352
Shelby.....	7	3	7,500	1	...	...	7,500	3	12.0	3	838	113	1	7	560	560
Sioux.....	8	8	23,000	...	...	...	23,000	8	11.3	6	511	85	5	6	2,236	457
Story.....	13	9	34,500	2	...	...	34,500	9	11.2	7	903	129	5	7	4,235	845
Tama.....	8	3	8,000	3	1	1,000	9,000	5	10.2	3	405	185	2	3	1,100	550
Taylor.....	5	4	11,800	1	...	...	11,800	4	12.0	3	315	105	1	5	600	600
Union.....	5	4	20,500	9	9	16,100	36,600	4	12.0	4	1,165	291	3	5	3,850	1,333
Van Buren.....	3	2	7,000	1	...	...	7,000	2	7.5	2	365	183	2	4	1,350	675

Wapello	4	1	2,000	...	...	...	3,000	1	5.0	1	22	23	1	10	201
Warren	2	2	5,000	...	3	4,000	9,000	2	12.0	2	320	160	1	7	500
Washington	6	4	17,500	...	...	...	17,500	4	12.0	4	1,028	257	3	4	2,590
Wayne	4	2	6,500	...	...	...	6,500	2	11.0	2	265	183	...	...	...
Webster	9	5	10,200	...	...	...	10,200	5	10.0	2	260	175	1	7	950
Winnnebago	8	6	16,200	...	7	8,200	24,400	6	11.1	6	786	131	6	7	904
Winneshiek	17	12	82,500	...	...	...	32,500	12	11.0	12	1,571	131	8	8	1,108
Woodbury	9	3	8,500	...	...	...	8,500	3	9.0	3	225	75	2	5	392
Worth	8	6	15,700	...	...	...	15,700	6	12.0	6	674	112	5	9	791
Wright	10	8	21,200	...	1	1,500	22,700	7	11.2	6	559	93	4	8	629
The state	798	562	\$1,699,650	161	59	\$90,100	\$1,739,750	575	11.0	504	58654	115	374	+7	298,332

*** Nearly.**

Average value of creameries, \$3,024.

Average value of skim stations, \$1,510.

At this valuation 798 creameries are worth \$2,398,269.

At this valuation 161 sklm stations are worth \$243,110.

Total value of all plants, \$2,641,379.

On the basis of the following table, it will be seen that the creameries of Iowa used a total of nearly 60,000 tons of coal during the year. Of this amount, about two-fifths was foreign coal, and the remainder was from Iowa mines. The fact that Iowa coal is not used more than it is arises from the lack of railroad facilities to the Iowa mines. A large part of the territory of the state is really nearer by railroad to the mines of Illinois than to the Iowa mines, and, as a consequence, the foreign coal is cheaper and is used instead of Iowa coal. Nearly 86 per cent, or 676, of the creameries burn coal, and 106 are reported as burning wood.

TABLE NO 6.
Separators, Testers and Fuel.

COUNTIES.	NO. OF CREAM-ERIES.		SEPARATORS.					TESTERS		FUEL.				
	Number of cream-eries operating	Number report-ing.	Total number of separators re-ported.	De Laval.	Sharples.	Jumbo.	Beld.	Babcock.	Russian.	Creameries re-ported.	Iowa coal, tons.	Foreign coal, tons.	Total tons of coal used.	Number cream-eries using wood.
The state.....	888	406	1,188	735	236	24	197	425	34	433	26,367	11,548	87,915	64
Adair.....	12	3	11	8	3	.....	.....	1	1	2	172	.....	172	.....
Adams.....	7	1	3	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Allamakee.....	5	3	9	4	.....	.....	5	3	1	4	.....	120	120	3
Appanoose.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Audubon.....	10	4	9	9	.....	.....	.....	4	.....	5	282	80	802	.....
Benton.....	12	7	14	5	.....	.....	9	7	.....	6	552	105	657	2
Black Hawk.....	18	14	37	25	9	.....	8	13	1	13	535	974	1,509	1
Boone.....	8	4	9	7	.....	.....	2	4	.....	4	299	.....	299	1
Bremer.....	26	23	60	39	11	2	8	11	2	19	.....	1,984	1,984	2
Buchanan.....	16	10	30	14	1	2	13	7	1	6	410	160	570	.....
Buena Vista.....	9	3	20	17	.....	.....	1	7	.....	3	425	25	470	2
Butler.....	23	17	40	23	14	.....	3	15	1	14	285	751	1,036	.....
Calhoun.....	11	6	8	5	.....	.....	3	4	1	5	490	.....	490	.....
Carroll.....	13	4	6	.....	2	.....	4	3	.....	1	80	.....	80	.....
Cass.....	7	1	14	14	.....	.....	.....	.....	1	1	250	.....	250	.....
Cedar.....	8	3	7	5	.....	1	1	1	.....	4	327	120	457	.....

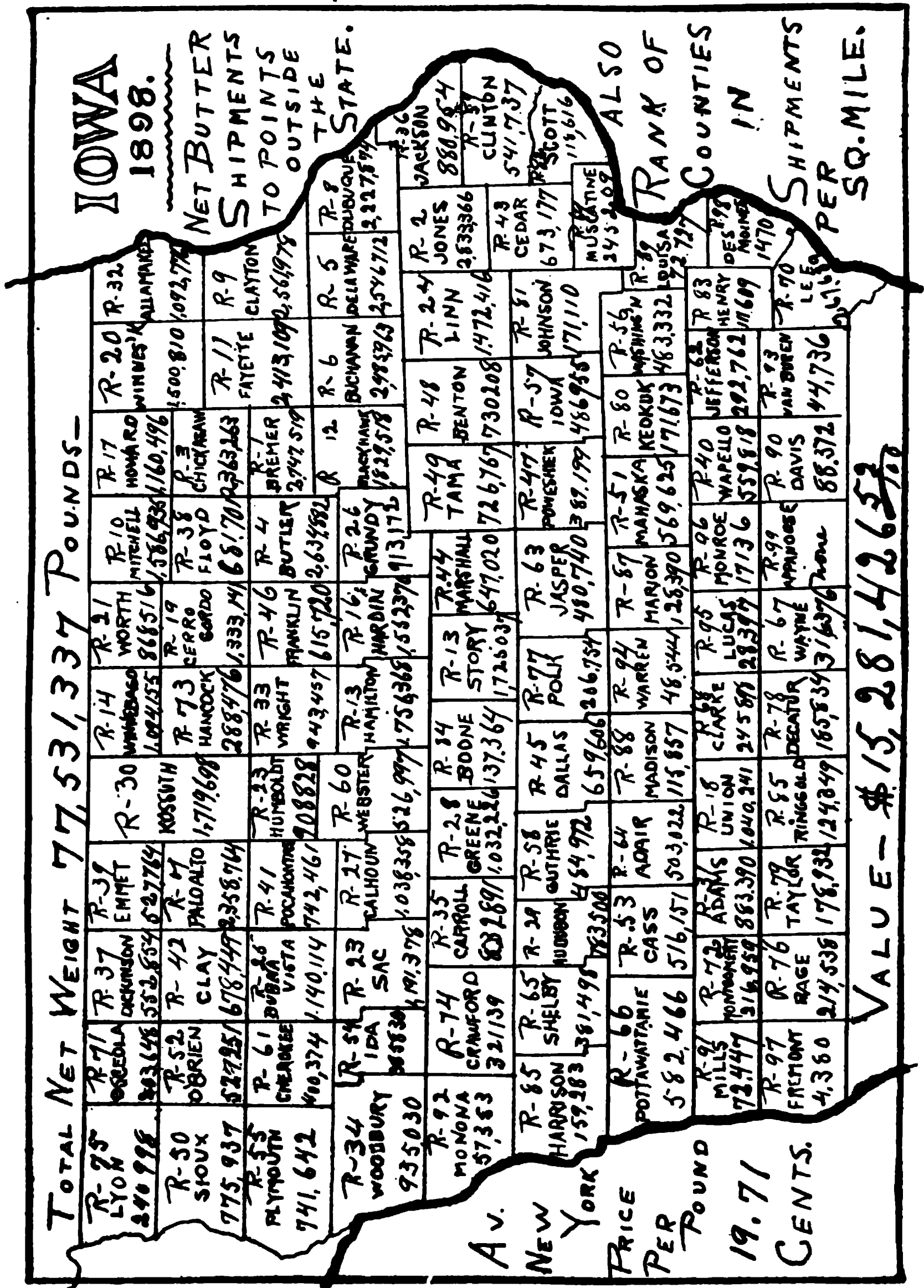
Cerro Gordo.....	12	4	9	6	2	1	...	5	...	5	379	80	459	.....
Cherokee.....	9	4	9	9	...	...	...	2	...	2	195	15	310	.....
Chickasaw.....	19	18	34	31	3	...	...	12	...	12	100	1,022	1,122	.....
Clarke.....	6	1	5	5	...	...	...	...	1	...	...	...	...	.....
Clay.....	9	3	6	6	1	...	...	...	1	...	...	...	...	.....
Clayton.....	19	18	29	23	2	2	12	17	3	...	575	40	615	10
OClinton.....	14	8	12	6	5	...	1	8	1	...	...	530	530	.....
Crawford.....	8	4	8	6	3	...	...	3	...	3	193	...	195	.....
Dallas.....	11	5	9	6	1	3	...	3	...	3	414	...	414	.....
Davis.....	3	2	3	...	1	1	1	2	...	2	50	45	95	.....
Decatur.....	3	...	...	...	...	...	...	...	...	...	...	...	...	.....
Delaware.....	31	17	40	18	8	...	14	13	1	...	418	602	1,020	5
Des Moines.....	...	...	...	...	...	...	...	...	...	...	...	...	...	.....
Dickinson.....	4	4	7	7	...	...	...	2	...	2	110	...	110	.....
Dubuque.....	23	17	43	8	18	...	17	13	1	...	20	195	215	9
Emmet.....	6	3	6	4	3	...	...	3	...	3	236	35	271	.....
Fayette.....	23	17	47	16	10	...	21	10	1	...	37	540	577	4
Floyd.....	6	5	9	6	3	...	...	8	...	8	180	80	260	1
Franklin.....	10	8	18	13	2	...	3	8	1	...	711	75	786	.....
Fremont.....	...	...	...	...	...	...	...	...	...	...	...	...	...	.....
Greene.....	9	6	23	19	4	...	...	4	...	4	386	...	386	.....
Grundy.....	19	13	23	14	1	4	7	11	...	11	533	581	1,103	.....
Guthrie.....	13	2	4	3	1	...	...	2	...	2	230	...	230	.....
Hamilton.....	12	7	16	13	2	...	1	5	1	...	646	...	646	.....
Hancock.....	10	5	9	7	2	...	...	5	...	5	402	40	412	.....
Hardin.....	14	10	20	20	...	...	...	8	...	8	830	...	830	.....
Harrison.....	4	2	4	2	1	1	...	2	1	...	125	...	125	1
Henry.....	4	3	4	3	...	1	...	1	...	1	40	...	40	.....
Howard.....	6	5	11	11	...	...	...	6	...	6	57	237	394	.....
Humboldt.....	9	7	16	15	...	...	1	8	...	8	779	...	779	.....
Ida.....	5	4	7	5	2	...	...	3	2	...	385	...	385	1
Iowa.....	2	1	1	...	...	1	...	3	...	3	135	...	135	.....
Jackson.....	18	11	29	2	19	...	8	6	1	...	...	100	100	5
Jasper.....	8	5	9	9	...	...	...	3	...	3	180	...	180	.....
Jefferson.....	9	7	10	9	1	...	...	3	...	3	106	...	106	1
Johnson.....	7	1	1	...	...	...	1	1	...	1	50	...	50	...
Jones.....	20	14	76	7	55	...	14	11	2	...	1,221	288	1,509	8
Keokuk.....	2	2	2	2	...	...	...	3	...	3	289	...	289	.....
Kossuth.....	21	15	34	33	...	...	1	12	...	12	1,175	403	1,578	.....

TABLE NO. 6—CONTINUED.

COUNTIES.	NO. OF CREAM-ERIES		SEPARATORS.					TESTERS		FUEL.				
	Number of cream-eries operating	Number report-ing.	Total number of separators re-ported.	De Laval.	Sharples.	Jumbo.	Reid.	Babcock.	Russian.	Creameries re-ported.	Iowa coal, tons.	Foreign coal, tons.	Total tons of coal used.	Number cream-eries using wood.
Lee.....	1	14	28	9	.....	.....	19	9	.....	11	353	351	703	28
Linn.....	30	.....	.....	.....	.....	.....	.....	.....	.....	2	15	.....	15	1
Louis.....	0	.....	.....	.....	.....	.....	.....	1	.....	1	144	.....	144	.....
Lucas.....	1	1	2	2	.....	.....	.....	1	.....	2	144	.....	144	.....
Lyon.....	4	2	4	4	.....	.....	.....	1	.....	2	43	105	143	.....
Madison.....	4	.....	.....	.....	.....	.....	.....	.....	.....	1	100	.....	100	.....
Mahaska.....	0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Marion.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....
Marshall.....	1	1	2	.....	1	.....	2	1	.....	3	370	.....	370	.....
Mills.....	1	1	1	.....	.....	.....	.....	1	.....	1	50	.....	50	.....
Mitchell.....	1	2	3	3	.....	.....	.....	1	.....	1	.....	640	640	.....
Monona.....	1	1	2	.....	1	.....	.....	1	.....	1	105	.....	105	.....
Monroe.....	1	1	1	1	.....	.....	.....	1	.....	1	70	.....	70	.....
Montgomery.....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Muscatine.....	5	3	5	2	1	.....	.....	2	.....	3	333	.....	333	.....
O'Brien.....	6	3	5	4	1	.....	.....	2	.....	2	51	.....	54	.....
Osceola.....	1	1	2	2	.....	.....	.....	1	.....	2	.....	65	65	.....
Page.....	6	3	5	3	1	1	.....	3	.....	3	127	90	217	.....
Palo Alto.....	17	14	29	25	2	.....	2	13	.....	10	1,034	180	1,164	.....
Plymouth.....	11	8	13	6	3	.....	3	5	1	7	437	234	661	.....
Pocahontas.....	9	6	11	7	2	.....	4	6	.....	3	337	.....	337	.....
Polk.....	8	4	6	6	2	.....	.....	2	1	3	267	.....	267	.....
Pottawattamie.....	4	3	5	2	3	.....	.....	2	1	3	170	80	230	.....
Poweshiek.....	4	2	3	1	.....	.....	2	1	1	2	178	.....	178	.....
Ringgold.....	2	1	1	1	.....	.....	.....	1	.....	2	155	.....	155	.....
Sac.....	13	7	19	16	.....	.....	3	6	.....	9	619	96	715	.....
Scott.....	2	1	1	1	.....	.....	.....	1	.....	2	25	26	51	.....

Shelby	8	3	6	6	6	10	2	1	2	3	4	320	.....
Sioux	8	7	13	3	3	10	10	.....	4	6	536	.....	
Story.. ..	15	9	20	16	16	2	2	1	7	981	.....	.....	.....
Tama	9	3	6	10	1	1	1	1	4	300	.....	.....	.....
Taylor	6	4	6	5	1	.....	.....	4	1	100	.....	.....	.....
Union	14	8	19	19	.....	.....	.....	3	1	1,106	.....	.....	.....
Van Buren.....	4	1	1	1	.....	1	.....	.....	1	.....	40	.....	.....
Wapello.....	4	1	1	.....	.....	1	.....	1	.....	43	.....	.....	.....
Warren	5	2	4	3	.....	1	.....	2	.....	65	.....	.....	.....
Washington.....	4	2	3	1	.....	2	.....	.....	3	130	.....	.....	1
Wayne	8	3	13	10	.....	.....	3	.....	3	576	.....	.....	.....
Webster	7	3	6	3	.....	2	.....	1	.....	254	.....	.....	.....
Winnebago.....	15	5	18	16	.....	2	.....	.....	6	427	.....	.....	.....
Winneshiek.....	6	5	7	7	.....	.....	.....	.....	11	400	.....	.....	6
Woodbury	9	3	3	2	.....	1	.....	.....	3	101	.....	.....	.....
Worth.....	8	5	11	8	.....	1	.....	2	.....	408	.....	.....	2
Wright.....	11	7	15	9	.....	1	.....	.....	7	352	.....	.....	.....
The state...	888	406	1,183	736	226	24	197	425	34	433	26,367	11,548	37,915	64

* One creamery run by water power.



RAILROAD BUTTER SHIPMENTS.

The courtesy of the different railroads of the state in reporting the total gross pounds of butter shipped from points within the state to points outside of the state is very highly appreciated by this office. These are the most satisfactory and reliable statistics received from any source and may be relied upon as showing the real condition of the butter-making industry of the state. The shipments are reported in gross, and a deduction of 16 per cent is made to show the net butter shipments to points outside the state. In the following tables the figures showing railroad butter shipments must be understood to be accurate and complete.

Following is a short table showing comparisons of net butter shipments of the state for the years 1890 to 1898 inclusive, and also a table showing the butter shipments by counties and comparisons with the butter shipments of the counties for the previous year. In every case the year ends with the first day of October.

TABLE No. 7.

Table showing total net butter shipments of the state for the years 1890 to 1898 inclusive, from Iowa to points outside the state; also increase or decrease as compared with the year preceding.

YEARS ENDING OCTOBER 1.	Net pounds of butter shipped.	Increase over preceding year.	Decrease from preceding year.
1890			
1891			2,555,080
1892			8,577,785
1893			5,540,029
1894			62,465
1895		11,987,691	
1896		13,535,806	
1897		3,557,155	
1898			6,088,744

The railroads report the shipments of butter out of the state in gross, and the following table contains the gross butter shipments by counties, together with a comparison with the shipments of the previous year. It will be seen that thirty-seven counties have made an increase and sixty-one counties have less

butter than in the previous year. Appanoose county had no butter shipments in either year. In comparing this table with the table of butter made as reported by the creameries, it should be borne in mind that the year for which the creameries reported was from May 1, 1897, to May 1, 1898; and that the year for which the railroads reported ended October 1, 1898. Any apparent discrepancies will be explained by this fact.

The increases are found to be mostly in those counties which have reported a small amount of butter in former years, while the decreases have been for the greater part in those counties where creameries have been long established. Of the counties reporting more than 1,500,000 pounds of butter shipped for the year 1897, only Hamilton, Hardin, Palo Alto and Jones show an increase. The other eighteen counties reporting for 1897 more than 1,500,000 pounds, show decreases up to 850,000 pounds; while of those making less than 1,000,000, thirty-one out of sixty-three show increases up to 425,000 pounds. The creamery business is increasing in those localities where it has been little tried before, and the decrease in the old counties is accounted for on the ground of the different conditions and can be only a temporary matter.

TABLE No. 3.

COUNTIES.	NUMBER OF CREAMERIES FOR 1897 AND 1898, WITH INCREASE AND DECREASE			GROSS POUNDS OF BUTTER SHIPPED OUT OF THE STATE FOR THE YEARS ENDING SEPTEMBER 30, 1897 AND 1898, SHOWING INCREASE AND DECREASE BY COUNTIES.			
	1897.	1898.		1897.	1898.	Increase	Decrease
The state.....	391	364	10	5,47,684	92,299,811	4,819,899	11,588,872
Adair.....	9	12		485,868	598,935	112,977	
Adams.....	8	7		718,988	694,512		22,414
Allamakee.....	9	9		610,204	1,200,924		590,720
Appanoose.....							
Audubon.....	6	11		222,598	222,728	230	
Benton.....	12	12		747,455	989,295	121,940	
Black Hawk.....	19	18		498,560	2,177,997		208,533
Boone.....	7	8		190,697	162,529		27,266
Bremer.....	24	25		294,299	2,270,355		18,442
Buchanan.....	15	17		742,614	2,259,420		763,194
Buena Vista.....	10	9		531,088	1,257,278		172,794
Butler.....	21	22		297,312	2,126,764		280,549
Calhoun.....	7	11		664,877	40	171,468	
Carroll.....	12	12		685,788	37		74,221
Cass.....	7	7		248,507	65	285,268	
Cedar.....	11	10		612,440	61		212,049
Cerro Gordo.....	11	12		710,620	72		122,548
Cherokee.....	7	9		621,534	26		144,768
Chickasaw.....	20	20		429,297	66		855,989
Clarke.....	4	5		226,496	26		90,970
Clay.....	9	9		593,047	77	211,430	
Clayton.....	21	20		441,667	74		411,608
Clinton.....	15	14		668,233	65		24,006
Crawford.....	8	8		268,280	26	22,928	
Dallas.....	6	11		984,785	783,245		201,040
Davis.....	2	4		66,689	105,505	18,516	
Decatur.....	8	3		14,170	185,534	171,664	
Delaware.....	27	31		2,531,556	2,081,860		252,754
Des Moines.....				167,248	1,470		185,772
Dickinson.....	2	4		527,905	655,159	120,254	
Dubuque.....	26	23		575,116	2,652,531		182,263
Emmet.....	4	6		589,995	625,220	41,225	
Fayette.....	22	22		379,232	2,672,749		606,589
Floyd.....	6	7		614,112	811,549	197,437	
Franklin.....	11	11		733,520	733,000		520
Fremont.....				2,895	4,220	1,425	
Greene.....	9	9		472,100	1,226,940		244,220
Grundy.....	12	12		410,605	1,067,110		656,505
Guthrie.....	11	12		464,226	577,948	112,122	
Hamilton.....	10	12		674,264	2,080,914	16,650	
Hancock.....	8	11		322,696	264,852	42,154	
Hardin.....	12	12		752,701	1,842,059	94,258	
Harrison.....	7	4		178,040	189,622	13,582	
Henry.....	3	4		82,445	182,268	50,423	
Howard.....	7	9		760,085	1,381,542		372,532
Humboldt.....	10	9		684,020	1,061,228	87,918	
Ida.....	5	5		467,376	469,221		2,045
Iowa.....	6	6		726,903	579,706		216,195
Jackson.....	12	12		682,277	1,048,755		14,522
Jasper.....	11	8		729,722	272,209		213,472
Jefferson.....	10	9		229,612	245,526		174,067
Johnson.....	9	8		162,020	202,702	40,682	
Jones.....	26	20		171,202	2,272,055	201,853	

TABLE No. 8—CONTINUED.

COUNTIES.	NUMBER OF CREAMERIES FOR 1897 AND 1898, WITH IN- CREASE AND DECREASE.				GROSS POUNDS OF BUTTER SHIPPED OUT OF THE STATE FOR THE YEARS ENDING SEPTEMBER 30, 1897 AND 1898, SHOWING INCREASE AND DECREASE BY COUNTIES.			
	1897.	1898.	Increase.	Decrease.	1897.	1898.	Increase.	Decrease.
Keokuk.....	5	3	..	2	345,895	304,378	..	141,532
Kossuth.....	20	21	1	..	2,518,619	2,047,300	..	471,359
Lee.....	2	1	..	1	453,790	318,677	..	135,113
Linn.....	28	29	1	..	2,908,347	1,752,876	..	465,371
Louisa.....	3	3	..	..	118,975	85,580	..	32,395
Lucas.....	1	1	..	..	73,340	33,806	..	39,534
Lyon.....	3	4	1	..	280,563	286,902	6,340	..
Madison.....	4	4	..	..	108,856	35	30,080	..
Mahaska.....	1	1	..	..	253,225	25	484,900	..
Marion.....	5	3	..	2	226,650	25	..	72,644
Marshall.....	7	11	4	..	915,079	52	..	145,417
Mills.....	3	4	1	..	84,635	47	..	12,288
Mitchell.....	5	9	4	..	2,100,805	08	..	211,597
Monona.....	2	1	..	1	53,227	77	14,200	..
Monroe.....	1	1	..	..	18,735	00	1,518	..
Montgomery.....	2	3	1	..	229,607	84	..	71,412
Muscataine.....	6	5	..	1	223,420	15	..	191,508
O'Brien.....	4	6	2	..	431,080	227,620	126,460	..
Osceola.....	4	1	..	3	104,120	242,428	122,218	..
Page.....	7	6	..	1	297,206	214,536	..	52,360
Palo Alto.....	16	17	1	..	1,809,229	2,308,052	908,512	..
Plymouth.....	10	11	1	..	943,315	822,907	..	66,408
Pocahontas.....	9	9	..	..	859,171	823,822	24,711	..
Polk.....	8	8	..	..	241,425	204,764	..	34,671
Pottawattamie.....	5	5	..	..	750,523	693,412	..	57,110
Poweshiek.....	8	6	..	2	500,686	462,323	..	37,363
Ringgold.....	4	3	..	1	108,226	124,249	21,124	..
Sac.....	14	12	..	2	1,441,747	1,418,207	..	23,440
Scotts.....	4	2	..	2	122,404	141,210	14,306	..
Shelby.....	6	8	2	..	380,559	454,164	122,805	..
Sioux.....	9	6	..	3	1,021,128	923,724	..	97,405
Story.....	18	16	..	2	2,422,437	2,052,615	..	269,822
Tama.....	8	11	3	..	635,460	665,190	179,740	..
Taylor.....	6	6	..	..	265,241	176,922	..	76,209
Union.....	12	14	2	..	1,200,209	1,226,222	..	152,427
Van Buren.....	3	4	1	..	75,476	52,267	..	22,219
Wapello.....	5	4	..	1	1,009,116	150	..	242,220
Warren.....	4	5	1	..	131,300	190	..	72,510
Washington.....	5	6	1	..	605,765	365	..	57,270
Wayne.....	6	9	3	..	313,542	170	2,534	..
Webster.....	6	9	3	..	912,127	177	..	294,780
Winnebago.....	12	15	3	..	1,199,976	125	102,530	..
Winneblesh.....	12	17	5	..	2,021,535	176	..	204,227
Woodbury.....	6	9	3	..	1,270,014	121	..	265,223
Worth.....	10	9	..	1	1,022,257	248	..	23,203
Wright.....	9	11	2	..	1,267,226	168	..	144,522
The State.....	691	654	101	28	60,547,664	60,392,211	4,212,200	11,582,272

Net decrease in butter shipments, 7,348,478 pounds.

TABLE No. 9.

NET BUTTER SHIPMENTS BY COUNTIES AND RANK—AREA OF COUNTIES.

Showing pounds of butter shipped per square mile and rank of counties; also total net butter shipments for the state and net pounds per square mile, for the year ending September 30, 1898.

COUNTIES.					
The state	77,581,237	56,025	*1,284		
Adair	503,022	57	770	648	64
Adams	884,290	33	423	1,679	31
Allamakee	1,008,778	24	658	1,681	28
Appanoose		59	518		99
Audubon	783,500	36	443	1,769	29
Benton	780,208	40		1,014	43
Black Hawk	1,322,518	11	576	3,178	13
Boone	137,264	52	576	228	94
Bremor	2,747,519	2	433	6,361	1
Buchanan	2,435,223	3	576	4,310	2
Buena Vista	1,140,114	23	576	1,979	25
Butler	2,534,582	3	576	4,672	4
Calhoun	58	25	576	1,203	27
Carroll	81	25	576	1,446	25
Cass	51	26	576	896	53
Cedar	77	44	576	1,169	43
Cerro Gordo	41	19	576	2,314	19
Cherokee	74	63	576	605	51
Chickasaw	23	3	504	4,899	3
Clarke	82	71	453	569	68
Clay	49	43	576	1,178	42
Clayton	78	4	722	3,519	9
Clinton	77	53	609	776	50
Crawford	39	66	720	446	74
Dallas	659,606	45	586	1,123	45
Davis	89,373	39	502	176	90
Decatur	183,634	73	534	343	73
Delaware	2,546,712	5	576	4,431	5
Des Moines	1,470	98	415	4	96
Dickinson	553,354	51	404	1,328	37
Dubuque	2,237,374	10	601	2,707	8
Emmet	527,761	53	494	1,306	29
Fayette	2,413,109	7	720	3,353	11
Floyd	661,701	42	504	1,353	36
Franklin	615,720	47	576	1,099	46
Fremont	4,330	97	509	9	97
Greene	1,032,236	27	576	1,792	26
Grundy	813,173		504	1,313	26
Guthrie	494,972	59	593	818	33
Hamilton	1,756,368	12	576	3,049	12
Hancock	238,476	60	576	501	72
Hardin	1,552,670	13	576	2,695	16
Harrison	150,233	62	605	220	85
Henry	111,609	63	423	259	83
Howard	1,160,496	21	476	2,428	17
Humboldt	906,322	21	423	2,104	23
Ida	395,330	54	423	301	54
Iowa	482,055	58	594	324	57
Jackson	390,354	23	626	1,381	26

BUTTER MARKETS.

The destination of the butter manufactured in this state is of interest to all creamerymen, and the following table and comparison is made for the purpose of showing the markets that must be depended upon to take our butter. Exports of Iowa butter to foreign countries are not reported fully enough to allow of any estimate being made as to its amount.

	Pounds. 1898.	—Per cent— 1898. 1897.	
New York City.....	30,903,920	64.53	71
Chicago	6,510,901	13.59	9.5
Boston	3,634,913	7.59	8 1
Philadelphia	1,351,304	2.82	3.4
New Orleans.....	1,192,304	2.49	1.6
Elgin	1,023,256	2.14	.8
Pacific Coast.....	562,072	1.17	.5
Cleveland	484,291	1.01	.9
Brooklyn.....	334,517	.70	--

Shipments were also made to sixteen states, to Washington, D. C., and to three foreign countries.

Muscatine.....	3	44,600	222,220	.....	.....	157,220	.....	.....	.....	.....	.....	.....
O'Brien.....	3	107,402	3,000	.....	.....	.....	.....	.....	.....	.....	.....	.....
Osceola.....	1	21,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Page.....	8	64,585	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Palo Alto.....	14	1,385,777	83,698	24,846	.....	.....	124,818	.....	.....	.....	.....	.....
Plymouth.....	7	283,603	205,319	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pocahontas.....	3	307,665	8,208	87,050	.....	.....	.....	.....	.....	11,000	.....	.....
Polk.....	1	.....	48,845	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pottawattamie..	2	50,000	327,367	.....	.....	.....	.....	.....	.....	.....	.....	.....
Poweshiek.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ringgold.....	1	59,313	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sac.....	9	435,505	75,474	10,683	.....	.....	.....	.....	.....	.....	.....	.....
Scott.....	1	.....	82,850	.....	.....	.....	.....	.....	.....	.....	.....	.....
Shelby.....	2	145,531	14,700	56,680	.....	.....	.....	.....	.....	.....	.....	.....
Sioux.....	5	324,640	10,700	.....	.....	.....	.....	.....	.....	.....	.....	.....
Story.....	7	548,634	75,716	14,409	.....	.....	.....	.....	.....	.....	.....	.....
Tama.....	2	71,606	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Taylor.....	3	188,346	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Union.....	6	30,000	467,800	.....	.....	.....	.....	.....	.....	.....	.....	.....
Van Buren.....	1	23,400	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Warren.....	1	.....	16,315	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington.....	3	162,000	39,540	66,946	.....	.....	.....	.....	.....	.....	.....	.....
Wayne.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Webster.....	4	181,193	24,131	48,599	.....	.....	.....	.....	.....	.....	.....	.....
Winnebago.....	6	511,606	4,920	1,910	.....	.....	.....	.....	.....	.....	.....	.....
Winneshiek.....	12	473,044	89,450	110,500	.....	.....	.....	.....	.....	.....	.....	.....
Woodbury.....	1	6,000	3,000	.....	.....	.....	.....	.....	.....	.....	.....	.....
Worth.....	5	384,305	2,800	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wright.....	4	255,831	11,746	3,024	.....	.....	.....	.....	.....	.....	.....	.....
The state.....	448	30,903,920	6,510,921	3,634,913	1,351,304	1,192,718	1,023,256	563,073	481,291	884,517	.....	.....

In addition to the shipments given in the above table, there were reported shipments as follows: New Haven, 803,730; Washington, D. C., 172,227; Pennsylvania, 355,077; New York, 341,804; Illinois, 249,346; Rhode Island, 203,830; New Jersey, 154,816; Missouri, 67,152; Kentucky, 43,786; Montana, 38,616; Kansas, 16,862; Colorado, 14,774; Michigan, 18,407; Massachusetts, 8,067; Wyoming, 3,573; Arizona, 3,243; Alabama, 1,704.

Foreign shipments, England, 66,162; Mauritius, 5,710; Burmah, 1,080.

Total of all shipments of which the destination is reported is 47,890,131 pounds.

Lucas.....	1	1	1,900,136	1	92,252	.....	.....	.....	92,252	1	4,610	63,979	23,063
Lyon.....	4	2	2,661,241	2	114,842	.....	.....	.....	114,842	1	2,560	4,236	108,037
Madison.....	3	1	440,000	1	20,000	.....	.....	.....	20,000	1	.....	.....	20,000
Mahaska.....	.....	.....	.....	1	.....	.....	300,000	.....	300,000	1	.....	15,000	285,000
Marion.....	1	.....	.....	1	.....	.....	91,121	.....	91,121	1	.....	.....	91,121
Marshall.....	4	4	2,604,591	4	111,089	.....	488,143	.....	599,231	1	4,640	.....	594,591
Mills.....	1	1	384,870	2	16,476	.....	14,000	.....	30,476	1	166	8,000	23,810
Mitchell.....	3	2	5,275,128	2	.....	.....	1,475,147	497,177	1,902,324	6	18,707	26,277	1,847,340
Monona.....	1	1	1,037,016	1	43,967	.....	.....	.....	43,937	1	4,487	35,160	4,300
Monroe.....	1	1	850,163	1	38,000	.....	.....	.....	38,000	1	.....	.....	38,000
Montgomery.....	1	1	1,451,880	1	65,400	.....	.....	.....	65,400	1	.....	.....	65,400
Muscatine.....	3	3	5,753,678	3	.....	.....	.....	456,815	456,815	3	325	30,000	426,490
O'Brien.....	6	3	3,502,270	3	152,594	.....	.....	.....	152,594	1	6,123	.....	146,463
Osceola.....	1	1	480,980	1	21,078	.....	.....	.....	21,078	1	.....	.....	21,078
Page.....	6	4	2,941,589	4	130,118	.....	.....	.....	130,118	1	1,175	.....	128,943
Palo Alto.....	17	16	44,461,395	16	2,053,037	.....	.....	.....	2,053,037	13	167,214	37,414	1,843,409
Plymouth.....	11	9	17,233,877	9	633,060	.....	.....	75,068	708,126	5	29,704	23,821	654,598
Pocahontas.....	8	6	12,202,962	6	553,013	.....	.....	.....	553,013	1	6,000	.....	547,013
Polk.....	5	4	6,532,419	4	296,259	.....	.....	.....	296,259	2	17,000	190,414	88,845
Pottawattamie.....	4	3	3,783,728	4	168,790	.....	400,000	.....	568,790	2	6,202	55,434	567,154
Poweshiek.....	3	1	182,000	1	6,000	.....	.....	.....	6,000	1	.....	.....	6,000
Ringgold.....	1	1	1,474,799	1	63,607	.....	.....	.....	63,607	1	4,304	.....	59,403
Sac.....	13	10	20,218,415	10	834,373	.....	.....	.....	834,373	6	35,235	23,508	825,610
Scott.....	2	2	1,261,717	2	53,820	.....	82,150	.....	86,170	2	1,490	36,300	48,890
Shelby.....	7	4	10,696,198	4	463,540	.....	.....	.....	463,540	2	6,000	.....	456,910
Sioux.....	8	5	6,772,760	5	267,483	.....	.....	.....	267,483	3	5,237	27,555	234,640
Story.....	13	13	26,570,131	13	1,169,612	.....	.....	.....	1,169,612	6	60,202	14,925	1,091,485
Tama.....	6	5	6,017,465	7	228,767	.....	111,869	71,608	412,244	3	3,716	.....	408,528
Taylor.....	5	4	6,070,400	4	263,970	.....	.....	.....	263,970	2	8,306	.....	235,074
Union.....	5	5	25,208,412	5	1,125,121	.....	.....	.....	1,125,121	3	33,500	.....	1,092,621
Van Buren.....	2	1	516,000	1	23,400	.....	.....	.....	23,400	1	1,100	.....	22,300
Wapello.....	4	2	2,711,862	2	113,687	.....	.....	.....	113,687	1	500	.....	112,187
Warren.....	2	1	847,769	1	32,080	.....	.....	.....	32,080	1	962	14,803	16,315
Washington.....	4	1	1,575,438	3	71,209	.....	219,853	.....	291,061	2	1,500	22,843	266,718
Wayne.....	4	3	6,882,494	3	244,841	.....	.....	67,823	302,664	1	.....	.....	302,664
Webster.....	7	3	3,435,196	3	145,493	.....	123,000	.....	268,493	1	2,500	.....	264,915
Winnebago.....	8	7	18,256,572	7	777,918	.....	.....	.....	777,918	5	67,193	9,186	701,534
Winneshek.....	6	5	4,789,410	14	72,000	.....	1,124,826	167,189	1,364,615	9	14,990	4,212	1,345,413
Woodbury.....	8	4	1,921,031	4	81,394	.....	.....	.....	81,394	1	3,000	12,233	86,161
Worth.....	7	6	14,712,628	6	533,283	.....	.....	70,638	653,931	5	37,364	800	615,907
Wright.....	9	4	6,618,733	4	247,483	.....	.....	40,000	287,483	3	8,973	10,000	289,009
Total.....	716	537	1,307,271,078	535	53,491,563	6,849,141	4,299,411	61,600,114	2,319,674	1,755,896	60,524,544		

LAW IN REGARD TO MILK-TESTING MACHINES.

The one thing that retards the growth of the creamery industry is the suspicion of the test. Nearly all the complaints that come to this department from the producers of milk are in some way related to the matter of the testing of the milk. The inspection of the testing apparatus of every creamery of the state would be a valuable work, but is impossible on account of the magnitude of the undertaking and the lack of appropriation and authority for appointing assistants to the dairy commissioner. The law as it now stands provides for accurate testers, but leaves to the operator the matter of making sure that the apparatus is correct, and throws upon him the burden of proof that he uses correct tests. A very large amount of correspondence has been found necessary in supplying bottles and pipettes as required by law, and a large number of creameries have not yet complied with the law. A brief explanation of the statute in regard to the testing of milk and the dairy commissioner's supplies for milk testers will not be out of place.

The law makes it obligatory on the part of all persons, firms, or corporations receiving or buying milk, according to its content of butter fat, to be provided with one standard D. C. test bottle and one standard D. C. pipette, for each creamery or cheese factory operating a milk-tester, to the end that all test bottles and pipettes used shall be verified and correspond in calibration with the standard D. C. test bottle and standard D. C. pipette. The law indirectly requires manufacturers of milk testers to submit them to examination by the director of the experiment station at Ames, who will, if the machine proves to be a suitable and reliable one, certify the fact to the dairy commissioner. This tends to secure the use of proper and accurate test-machines and to exclude those that are found by the examiner to be unreliable or faulty. This is a positive advantage to the creamery manager, for he can make sure that he is using a machine that has been tested scientifically and not been found wanting. The certificate also specifies the number of revolutions the machine must make to do good work.

The different makes of testers having been certified to the dairy commissioner, he is required to supply one standard bottle and one standard pipette to every creamery making proper application for them and using a proper and certified tester. This may work some small hardship to the creamery manager who finds that his old machine does not meet the requirements, but the small expense of a new tester will be more than balanced by the increased confidence in the manager on the part of the patron. Creamery operators are accused of a great deal more dishonesty than they should be, and it will lessen the patron's suspicion very much to know that the machine that makes his milk test large or small is of an approved pattern.

The standard bottles and pipettes supplied by the dairy commissioner are numbered and marked with the letters "D.C.," and are accompanied by a certificate that the bottle or pipette is correctly calibrated, that it is suitable for use in the tester named in the application, and that the machine has been certified as one that is reliable when properly operated. He also sends with each certificate a card of instructions for a simple method of comparing the glassware used in the tester with the standard. The need of such verification does not seem to be fully understood. The bottles sold by the dealers show a very large per cent of incorrectly calibrated bottles. Even the supplies bought by this department under a guarantee of accuracy show a small percentage of inaccurate ones. All D. C. supplies are thoroughly tested under the direction of the dairy commissioner. If the directions accompanying each bottle and pipette were fully carried out and the law were fully complied with by all the creameries, unconscious inaccuracy in milk testing would be reduced to a minimum.

This law affords a patron a means of knowing whether the machinery of the test is accurate or not. It requires that the D. C. supplies and the certificates accompanying be kept for the inspection of the patrons at all times. The same provision affords the creamery manager a means of showing to the suspicious patron the fact that the test machine is a proper and reliable one and is properly and carefully operated. The law says that "in any action arising between any such operator and patron, the burden of establishing the use of reliable tests, and the results therefrom equivalent to the standard herein provided, shall be upon the operator." (Sec. 2523.) If the operator has complied with the law the matter is very simple, but if not he places himself in a very difficult position.

CERTIFIED MILK TESTERS.

Below will be found a list of the milk testing machines which have been examined at the experiment station at Ames and certified to this office as required by law. The dairy commissioner, in accordance with the statute, has on hand the bottles and pipettes suitable for use in the machines listed below:

STEAM MACHINES.

Cornish, Curtis & Green. *Curtis Babcock*, 20 bottles, 24 bottles and 30 bottles.

F. B. Fargo & Co. *Fargo's New 40 Bottle*.

Elgin Manufacturing Co. *Standard*, Nos. 1, 2, 3, and 4; *Russian*, No. 1, 12 bottles; No. 2, 24 bottles.

Creamery Package Manufacturing Co. *Ideal Turbine*, 20 bottles, 24 bottles, 32 bottles and 40 bottles; *Cushman Turbine Tester*, 24 to 40 bottles.

Haney-Campbell Co. *Superior*, 24 bottles; *Haney Tin Tester*, 20 bottles; *Haney's Turbine Tin*, 12 bottles, 16 bottles, 24 bottles and 30 bottles.

A. H. Barber & Co. *Doctor Babcock's Milk Tester*, 20 bottles, 24 bottles, 30 bottles, 36 bottles and 40 bottles.

D. H. Burrell. *Facile*, iron frame, 24 bottles.

Vermont Farm Machine Co. *Doctor Babcocks*, 20 bottles.

HAND MACHINES.

Creamery Package Manufacturing Co. *Roe Pattern*, 8 bottles and 24 bottles; *Curtis Babcock*, 15 bottles.

Elgin Manufacturing Co. *No Tin Babcock*, 6 bottles.

FINANCIAL EXHIBIT.

EXPENDITURES.

Commissioner's salary.....	\$1,419.35
Commissioner's contingent expense.....	249 05
Clerk's salary.....	900.00
Milk agents' fees.....	1,437.00
Milk agents' expense.....	86.42
Stationery and printing.....	152.75
General office expense.....	53.04
Telegraph and telephone	20.93
Express and freight.....	46.10
Analyses	23.00
Milk agent's special work.....	13.50
Extra office help.....	239.50
Total.....	<u>\$4,640.64</u>

RECEIPTS.

For 574 milk permits.....	\$ 574.00
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OLEOMARGARINE

During the year two licenses have been issued for the sale of oleomargarine in this state, one in Dubuque and one in Council Bluffs. The collectors of internal revenue for this state report that oleomargarine is still shipped into the state direct to the consumer, but will not specify the amount nor the specific destination to which shipments are made. The dairy commissioner, at a date later than the filing of this report with the governor, caused complaint to be entered against the dealer in Council Bluffs, charging him with selling oleomargarine of a yellow color. The defendant agreed to stop the sale of the imitation butter, and, on the advice of the county attorney, the case was dropped. The dealer in Dubuque is now the only one in Iowa authorized to sell oleomargarine, and so far as known to this office he is complying strictly with the laws of the state.

There came to this office one anonymous complaint of the use of what the complainant thought to be oleomargarine in a hotel, without the proper display of the signs ordered by the law. The information was so meager that no case could be made out, and nothing was done. The cooperation of all creamerymen and dairymen is requested in the enforcement of the dairy laws of this state in regard to the sale of imitation dairy products. It is believed that the law now on the statute books is as good a law as is found in any state, and as stringent as can be passed; also that it is well enforced. The fact that but one complaint of its violation has come to hand indicates that the amount of oleomargarine that is fraudulently used is small.

CHEESE MAKING IN IOWA.

Very little of an encouraging nature can be found in the reports of the cheese factories in this state. Eight cheese factories have been changed to creameries or skim stations, seven have closed, and six new factories are reported, making a net loss of nine plants. The total product of the state will amount only to about one and one-half pounds per capita. It is hoped that future years will show a great increase in the amount manufactured. The state ought to produce all its own food supplies, and especially its dairy foods. Nevertheless it is apparent that the cheese-making industry is far behind the butter-making industry. It is also apparent from a comparison of reports of previous years and the present year that there is a tendency to make creameries out of cheese factories as soon as the amount of milk received will allow it. Probably the solution of the matter will be found in those factories that make butter and cheese both at different times of the year. There are at present nine such factories in operation.

It will be seen from the table that about one-sixth of the cheese made was shipped out of the state. The amount invested in cheese factory property is nearly \$100,000, and the total value of cheese made is close to \$350,000 for the state.

TO THE MILK DEALERS OF THE STATE OF IOWA.

Your patrons want clean, sweet milk.

They want it rich in cream and solids.

They are much better pleased if it is delivered in clean, bright cans, and by a clean, gentlemanly man who drives a tasty, clean wagon.

They note with displeasure the sediment that sometimes settles in the bottom of the white pitchers, and are not deceived when you tell them that it comes from the wear of the cans. They know very well that it belongs in the barnyard.

They know the flavor of good milk that comes from healthy cows fed upon good food, and do not like the milk from cows fed upon slops or fermented feed of any kind.

They will not buy milk, if they know it, with any substance put in it as a preservative.

They will consume double the quantity of good milk that they will if it is poor.

They are willing to pay for a good article, but all men dislike to pay for a poor one.

Milk will absorb and carry disease germs from your cow or your family to those to whom you sell the milk. Therefore sell no milk from diseased cows or when your family are sick with any contagious disease.

Use pure water to wash all milk cans. Twenty cases of typhoid fever have been traced directly to a milkman who used stagnant water for this purpose.

Give the cows pure water. Allow no cows to stand in stagnant, muddy ponds of water.

If you must stable cows in sheds then see to it that the floor is sufficiently raised to admit of fluids draining away from the cow. Twenty-five or fifty dollars well spent would revolutionize some stables inspected.

It is a filthy and bad practice to allow manure heaps to accumulate against and around your barns to ferment and render bad the sanitary conditions of your stock and home, as well as the milk you deliver to your customers.

Always keep in mind the little children who are to drink the milk sold by you. They are as precious to the city as to the country parent.

Cream rises rapidly on milk; hence dipping constantly from the top of the can, without thoroughly stirring, usually leaves the last half of the milk below standard—3 per cent butter fat.

Change water in tank where milk is cooled every day.

Place tank away from the barn and thoroughly cool and aerate the milk as soon as drawn from the cow.

It pleases the clerk of this office to record tests of milk at or near 4 per centum, but to record tests of from $2\frac{1}{2}$ to 3 per centum is not pleasant work.

If you wish to be prosperous and happy do a little better than comply with the above suggestions.

If your heart and mind are right you will assist the milk inspector of your city to raise the standard of milk sold in your city.

The people who buy are entitled to good milk, and the laws of the state are only for the purpose of forcing unwilling men to give it to them.

As dairy commissioner, I am glad to say that most of the dealers are furnishing milk of a good quality and of a good standard.

Study the following tests for the cities of the state.

I have known many men engaged in producing milk who have become well to do by following the above suggestions, but can now think of none who followed the opposite plan and succeeded.

Good food will greatly influence the quantity of milk as well as its flavor, but to increase the richness you must get another and better cow.

Own and milk cows that give you good, rich milk. It costs you no more to feed and milk cows that give 4 per cent milk than it does cows that give 3 per cent milk.

Milk is the natural infant food of man and beast, and nature makes no mistakes; so give it to infants pure, sweet and clean.

[L. S. GATES.]

INSPECTION OF CITY MILK DEALERS.

The inspection of city milk dealers is carried on in the thirteen cities of the state which have more than 10,000 inhabitants. In the following tables the numbers show the test for each dealer for each month, about half the numbers indicating a single test and the others showing the average of two or more tests in the month. The numbers in the last column but one show the value of the tests below standard, and are not averages but single tests. The numbers in the last column are averages of cream tests for the year.

The legal standard for milk in this state is 3 per cent of butter fat, which is less than in some of the eastern states. This standard is low enough to protect the milk dealer, for first-class milk will show nearer 4 per cent than 3 per cent of butter fat. The legal standard for cream is 15 per cent of butter fat.

A careful inspection of the following tables will show the relative value of the milk sold by the different dealers in each city.

Read also the sections of the law which apply, sections 2524 to 2527 inclusive.

It is believed that the inspection of milk in the cities affected by the work of this office is in worthy and efficient hands. A list of the milk inspectors follows:

Burlington.....	W. B. McChesney
Cedar Rapids.....	Dr. J. W. Griffith
Clinton.....	Allen E. Rumble
Council Bluffs.....	Rupert Fleming
Davenport.....	H. J. High
Des Moines	Currie C. Chase
Dubuque.....	Dr. B. Michel
Ft. Madison.....	Camp Thomas
Keokuk	F. Harshman
Marshalltown	E. M. Singleton
Muscatine.....	A. K. Raff
Ottumwa.....	E. B. Hill
Sioux City.....	O. P. McCray

CLINTON—CONTINUED.

NAME OF DEALER.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Below stand- ard.	Cream.
Caplan, C. F.	4.0	3.8	4.4	4.9	4.4	5.1	4.9	...	4.8	5.0	5.9	...	...	...
Carpenter, P.	3.3	3.7	3.6	4.1	...	4.4	...	...	...	...	...	...	...	...
Olafsen, E.	3.4	3.8	3.9	...	4.3	4.3	4.4	...	4.0	4.3	4.4	5.5	...	...
Everman, H.	3.6	3.6	3.6	4.8	...	3.8	...	...	...	...	...	...	...	...
Fanger, H.	3.8	3.6	3.6	3.6	3.7	4.0	4.8	...	4.7	4.0	3.8	3.9	...	...
Fitch, H.	4.1	4.4	4.0	4.8	4.7	4.7	4.4	...	3.9	4.2	3.6	3.8	...	...
Gertzen, D.	3.8	3.6	4.1	...	4.3	...	4.3	...	3.9	3.8	3.3	3.2	...	...
Gideonson, John	4.4	3.7	...	4.0	4.4	4.5	4.3	...	3.9	4.0	...	4.4	...	...
Grumstrup, Paul.	4.1	3.3	...	4.1	...	5.1	5.0	...	4.9	4.6	...	...	...	...
Heath & Stockwell.	3.9	4.0	3.4	...	4.3	4.1	4.7	...	4.1	4.0	...	...	...	...
Heath, Clinton.	...	...	...	4.1	...	...	...	...	...	...	...	...	...	...
Johnson, Nels.	...	...	3.8	3.4	3.8	3.9	4.5	...	...	...	...	...	...	...
Johnson, Gus.	3.6	...	3.6	4.4	4.4	4.5	3.3	...	...	...	...	4.3	...	...
Krogman, Frank.	3.3	3.3	4.0	4.2	4.6	4.0	4.6	...	4.0	3.8	3.3	3.6	...	...
Kennedy, John J.	5.0	3.3	3.0	...	...	3.0	3.9	...	...	...	...	...	...	...
Miller, M. O.	4.4	3.8	3.7	4.6	4.7	4.6	4.3	...	4.5	4.3	3.3	4.0	...	...
Morrissey, Owen.	3.2	3.6	4.1	4.6	4.3	4.3	...	...	4.6	4.1	3.6	3.0	...	...
Nissen, O.	4.1	4.0	3.5	4.1	4.1	3.7	...	...	4.1	3.8	3.7	3.4	...	...
Nielson, O.	4.7	3.7	4.3	...	4.6	3.8	...	...	4.3	5.0	3.5	4.6	...	...
Oleson, E.	3.3	...	4.0	4.3	4.6	4.4	4.3	...	3.8	...	...	...	...	...
Oleson, J. E.	3.9	4.0	4.3	4.8	4.5	...	...	...	4.3	3.8	3.3	3.6	...	34.6
Paulson, Carl.	3.6	3.6	4.0	4.6	4.3	5.0	5.3	...	4.9	4.0	3.3	4.7	...	...
Peterson, Nels.	4.0	3.3	4.7	4.8	...	4.3	...	...	3.8	4.4	...	3.5	...	...
Peterson, O.	3.7	3.3	3.6	4.0	3.9	4.3	4.1	...	4.4	4.1	4.1	3.3	...	...
Rasmussen, F.	...	...	3.6	4.4	4.3	4.6	4.5	...	...	4.6	4.0	3.0	...	...
Reter, J.	3.8	3.3	4.0	4.4	4.3	3.3	4.3	...	4.0	4.3	4.0	3.9	2.7	25.7
Runquist, J. A.	...	...	...	...	...	...	...	...	...	4.0	3.0	...	...	...
Schmidt, P.	3.4	...	...	3.3	4.3	3.3	4.0	...	4.0	4.6	3.1	4.7	...	...
Seeger, Charles.	3.4	3.3	3.6	3.8	4.3	...	5.0	...	4.3	3.9	4.1	3.3	...	...
Simmons, S.	4.3	4.0	...	5.0	4.5	...	5.0	...	4.3	3.9	4.1	3.6	...	...
Thompson, C.	4.3	...	4.7	...	5.3	4.3	...	...	...	...	...	...	...	...
Westfall, L. G.	...	...	...	...	...	...	...	...	4.0	4.5	3.4	3.6	...	...

COUNCIL BLUFFS.

Number of permits, 26.

DAVENPORT.

Number of permits, 35.

Abraham, H. T.	3.7	3.4	4.0	3.3	3.9	3.4	...	...	...	...	...	...	...	...
Armli, J.	3.6	...	3.6	...	4.3	3.6	3.7	3.2	3.3	3.4	...	...	...	...
Arp, Hans.	3.0	3.3	3.4	...	4.6	...	4.3	3.6	...	...	...	3.6	...	...
Atkinson, G. S.	5.4	4.6	...	4.5	...	4.3	4.7	...	5.4	5.0	...	...	...	...
Bertram, J. H.	...	...	3.3	...	4.0	...	3.6	3.4	4.1	...	3.6	...	...	...

DAVENPORT—CONTINUED.

NAME OF DEALER.	July.	August.	September.	October.	AT 10 CENTS.	December.
Berger, F. E.	2.8	2.8	2.8	2.8	2.8	2.8
Blumer Bros.	2.8	2.8	2.8	2.8	2.8	2.8
Bruhn, H.	2.8	2.8	2.8	2.8	2.8	2.8
Bruhn, L.	2.8	2.8	2.8	2.8	2.8	2.8
Barraclough, G.	2.8	2.8	2.8	2.8	2.8	2.8
Buhman, William	2.8	2.8	2.8	2.8	2.8	2.8
Bridewell, T. O.	2.8	2.8	2.8	2.8	2.8	2.8
Christianson, O.	2.8	2.8	2.8	2.8	2.8	2.8
Ooglan, Thomas	2.8	2.8	2.8	2.8	2.8	2.8
Oowiezell, John	2.8	2.8	2.8	2.8	2.8	2.8
Oowiezell, Jacob	2.8	2.8	2.8	2.8	2.8	2.8
Carstensen, August	2.8	2.8	2.8	2.8	2.8	2.8
Dismer, W.	2.8	2.8	2.8	2.8	2.8	2.8
Drier, F.	2.8	2.8	2.8	2.8	2.8	2.8
Flambo, G.	2.8	2.8	2.8	2.8	2.8	2.8
Gaukler, Joe	2.8	2.8	2.8	2.8	2.8	2.8
Goetsch, H. J.	2.8	2.8	2.8	2.8	2.8	2.8
Haase, H.	2.8	2.8	2.8	2.8	2.8	2.8
Herriman, H.	2.8	2.8	2.8	2.8	2.8	2.8
Harrison, J. W.	2.8	2.8	2.8	2.8	2.8	2.8
Harmes, Henry	2.8	2.8	2.8	2.8	2.8	2.8
Heuer, Olaus	2.8	2.8	2.8	2.8	2.8	2.8
Heuer, John	2.8	2.8	2.8	2.8	2.8	2.8
Hieselman, H.	2.8	2.8	2.8	2.8	2.8	2.8
Haller, Charles L.	2.8	2.8	2.8	2.8	2.8	2.8
Jurgenson, J.	2.8	2.8	2.8	2.8	2.8	2.8
Kelling, Fritz	2.8	2.8	2.8	2.8	2.8	2.8
Kellogg, H.	2.8	2.8	2.8	2.8	2.8	2.8
Koch, John	2.8	2.8	2.8	2.8	2.8	2.8
Lange, J.	2.8	2.8	2.8	2.8	2.8	2.8
Laible, J. F.	2.8	2.8	2.8	2.8	2.8	2.8
Larsen, A.	2.8	2.8	2.8	2.8	2.8	2.8
Maves, John	2.8	2.8	2.8	2.8	2.8	2.8
Mess, Henry	2.8	2.8	2.8	2.8	2.8	2.8
Mueller, A.	2.8	2.8	2.8	2.8	2.8	2.8
McClosky, J. H.	2.8	2.8	2.8	2.8	2.8	2.8
Newman, E. H.	2.8	2.8	2.8	2.8	2.8	2.8
Nagel, H.	2.8	2.8	2.8	2.8	2.8	2.8
Puls, John	2.8	2.8	2.8	2.8	2.8	2.8
Peterson, P.	2.8	2.8	2.8	2.8	2.8	2.8
Prigoitz, A.	2.8	2.8	2.8	2.8	2.8	2.8
Peterson, Hans	2.8	2.8	2.8	2.8	2.8	2.8
Prinz & Moffatt	2.8	2.8	2.8	2.8	2.8	2.8
Peters, O.	2.8	2.8	2.8	2.8	2.8	2.8
Ramm, Max.	2.8	2.8	2.8	2.8	2.8	2.8
Ramm, Fred.	2.8	2.8	2.8	2.8	2.8	2.8
Ruhman, O.	2.8	2.8	2.8	2.8	2.8	2.8
Ren, Lenhard	2.8	2.8	2.8	2.8	2.8	2.8
Sivertsen, O. F.	2.8	2.8	2.8	2.8	2.8	2.8
Schladitz, A.	2.8	2.8	2.8	2.8	2.8	2.8
Schmidt, John	2.8	2.8	2.8	2.8	2.8	2.8
Schnoor, O.	2.8	2.8	2.8	2.8	2.8	2.8
Schrumer, Max.	2.8	2.8	2.8	2.8	2.8	2.8
Springhorn, P.	2.8	2.8	2.8	2.8	2.8	2.8
Schoening, Bros	2.8	2.8	2.8	2.8	2.8	2.8
Stuhr, Theo.	2.8	2.8	2.8	2.8	2.8	2.8
Sachan, M.	2.8	2.8	2.8	2.8	2.8	2.8
Thiesen, Paul	2.8	2.8	2.8	2.8	2.8	2.8
Van Tug, J.	2.8	2.8	2.8	2.8	2.8	2.8
Woehik, John	2.8	2.8	2.8	2.8	2.8	2.8
Willers, H.	2.8	2.8	2.8	2.8	2.8	2.8
Weise, E.	2.8	2.8	2.8	2.8	2.8	2.8
Zarn & Flambo	2.8	2.8	2.8	2.8	2.8	2.8
Zinner, George	2.8	2.8	2.8	2.8	2.8	2.8

DES MOINES.

Number of permits, 140.

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1898.]

STATE DAIRY COMMISSIONER.

75

DES MOINES—CONTINUED.

DUBUQUE.

Number of permits, 49.

DUBUQUE—CONTINUED.

NAME OF DEALER.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Below stand- ard.	Cream.
Spencetaky, A.	3.8	4.2	4.5	4.2	4.0	4.8	4.0	4.5	4.5	3.8	...	4.4	...	...
Butter, L. ....	...	3.8	3.8	4.0	4.0	3.8	3.8	4.0	4.0	3.8	...	4.4	...	...
Schlegel, M.	4.0	4.0	3.8	4.0	4.0	3.8	4.0	4.0	4.0	3.8	...	4.4	...	...
Thorman, G. A.	4.1	4.0	3.8	4.1	3.8	3.7	4.0	4.0	4.0	4.0	...	4.0	...	...
Walker, O. H.	4.0	4.0	4.3	3.8	3.8	4.4	4.0	4.0	4.4	4.0	...	4.0	...	...
Weiland, A. ....	...	...	...	...	4.0	4.4	...	...	4.4	3.8	...	4.0	...	...
Ziegler, C. ....	...	4.0	...	3.8	4.0	4.0	...	...	3.8	3.8	...	3.8	...	...

FORT MADISON.

Number of permits, 16.

KEOKUK.

Number of permits, 17.

MARSHALLTOWN.

Number of permits, 12.

MUSCATINE.

Number of permits, 17.

Beegner, O.	4.3	3.8	3.7	...	4.0	4.2	4.5	4.2	4.0	...	3.9	...	30.0
Bierman, H. B.	4.4	4.0	4.1	...	4.6	4.8	4.9	4.6	4.3	4.0	...	4.3	23.8
Dankert, John	4.8	..	4.4	...	5.0	5.2	5.3	5.2	4.5	4.4	...	4.0	..
Greenaway, Mrs. Julia	4.6	..	3.8	...	3.6	4.6	4.5	4.5	4.5	3.8	...	4.1	..
Harris, O. H.	3.7	3.8	3.9	...	4.2	4.0	4.1	4.2	3.9	...	...	3.9	24.2
Lake, P. B.	3.3	4.4	4.7	...	3.4	4.8	4.2	4.1	3.9	4.1	...	4.2	21.3

MUSCATINE—CONTINUED

OTTUMWA.

Number of permits, 19.

Bizer, J. F.	4.0	3.2	4.0	4.0	3.9	4.0	4.5	4.0	4.8	4.8	3.5	3.4	..	..
Chrisman, W. P.	3.8	3.8	4.4	3.4	..	..	..	..	..	..	..	..	..	..
Cundiff, D. E.	4.6	3.7	4.1	3.7	4.0	4.4	4.4	5.7	4.9	4.7	4.4	4.4	..	..
Daggett, E.	4.5	4.0	4.6	3.1	4.8	5.4	4.6	5.4	6.7	4.4	3.9	3.2	..	..
French, Mrs. E. T.	3.9	3.7	4.2	4.0	4.9	5.4	4.7	6.4	9.0	4.0	..	3.7	..	..
Harsco, J.	3.4	3.8	3.0	4.5	4.1	4.1	4.9	4.2	4.7	4.9	4.2	3.2	..	..
Hutson, T. L.	3.8	4.1	5.4	5.0	6.6	4.0	5.0	5.5	4.9	4.2	4.1	4.5	..	..
Johnson, O. E.	4.7	4.3	4.0	3.8	4.4	1.8	5.0	4.7	4.7	4.7	3.9	..	..	..
Michael, B. F.	3.0	5.8	5.2	3.1	4.9	3.6	3.7	4.1	3.6	4.4	4.0	3.4	..	..
Montague, H.	4.6	6.6	4.4	4.7	9.0	5.7	5.2	5.3	6.7	6.2	6.8	4.6	..	..
Noble, T. H.	4.2	3.1	5.6	4.7	4.6	5.2	5.6	5.3	5.2	4.3	4.3	..	..	..
Otterberg, M.	4.1	4.0	9.0	5.1	5.7	4.2	5.0	5.0	4.8	5.9	6.2	4.5	..	..
Simmons, N. O.	3.3	5.0	5.0	3.3	4.1	4.2	3.3	6.7	4.0	4.6	4.4	4.0	..	..
Simpson, M. D.	..	..	..	..	..	..	4.9	..	..	4.6	3.1	..	..	..
Thornburg, T. M.	5.0	4.0	..	4.5	3.4	4.0	4.2	4.6	5.7	..	3.3	..	..	..

SIOUX CITY.

Number of permits, 63.

TABLE NO. 14.

CITIES.	Population cen- sus of 1895.	Permits for 1898-99.	Number selling whole milk.	Number selling cream.	Number selling skimmed milk.	Number of fam- ilies supplied.	Number of hu- tels, restau- rants, etc.	Yearly value of milk sold.	Jerseys.	Grade Jerseys.	Holsteins.	Grade Holstein	Shorthorns.	Grade Short- horns.	Common or not reported.	Total cows.	Average in- come per cow.
Burlington.	25,246	50	30	15	12	3,351	40	\$ 51,050	66	187	21	67	24	170	110	635	\$ 77.90
Cedar Rapids	21,555	48	48	25	18	4,083	59	63,740	73	170	16	72	86	142	350	934	72.61
Clinton	23,337	36	36	12	6	3,601	66	53,000	84	58	20	33	40	184	135	551	97.66
Council Bluffs.	20,189	29	29	13	4	1,668	66	41,000	50	51	43	28	54	137	56	410	100.00
Davenport.	30,010	77	77	45	30	8,312	121	109,200	128	135	111	45	87	104	685	1283	85.11
Dt s Moines.	56,359	129	129	80	65	13,674	185	192,000	68	244	320	68	780	316	248	2,64	88.77
Dubuque.	40,574	50	50	21	8	5,923	97	89,500	123	113	49	20	59	31	600	1,95	89.94
Ft. Madison.	10,022	16	16	10	4	1,398	43	21,600	21	43	2	5	6	30	138	245	88.16
Keokuk.	14,287	17	17	9	2	2,356	72	33,400	109	105	15	14	52	90	41	426	90.14
Marshalltown.	10,049	16	16	10	9	2,970	65	25,600	21	81	18	51	30	117	81	409	87.04
Muscatine.	12,237	18	18	13	11	1,581	21	25,400	89	94	17	57	21	76	12	368	70.10
Ottumwa	16,761	23	23	13	7	2,760	107	41,200	76	72	18	166	88	99	12	519	81.24
Sioux City	27,371	51	51	28	15	3,122	63	68,000	54	81	91	83	20	120	240	701	80.17
Total.	308,037	540	540	294	190	54,932	1011	\$ 823,940	938	1537	751	709	1360	169	2699	9633	\$ 85.53

TABLE OF CONTENTS.

	PAGE.
Practical suggestions in dairy and creamery management.....	5
Dairy laws of Iowa.....	9
Dairy commissioner—D. O. test bottles and pipettes to be kept.....	9
Imitation butter and cheese.....	10
Reports from creameries and city milk dealers.....	12
Milk test, city milk inspection—Permits.....	12
Inspection—Penalties—Compensation—Sale of impure or skimmed milk— Skimmed milk cheese..	14
What deemed adulterated milk—Duty of commissioner.....	15
Report from Iowa creameries—Report blank used.....	17
Farm separators.....	20
Cost of making a pound of butter.....	21
Butter prices.....	22
The creameries of Iowa ...	22
Summary of numbers and kinds of creameries and skim stations.....	26
Dairy map—showing creameries, skim stations and cheese factories.....	27
Table No. 3: Statistical; number of creameries and skim stations.....	28
Butter-makers and other employes.....	30
Table No. 4: Showing butter-makers and other employes and remuneration.....	31
Summary: Value of dairy plants, months operated, average number of patrons, number of cows.....	35
Table No. 5: Showing value of dairy plants, etc.....	36
Fuel used in creameries.....	41
Table No. 6: Separators, testers and fuel.....	42
Map showing net butter shipments, and rank of counties in shipments per square mile....	46
Railroad butter shipments.....	47
Table No. 7: Total annual net butter shipments, 1890-98.....	47
Table No. 8: Gross butter shipments by counties—Increase and decrease.....	48
Table No. 9: Net butter shipments by counties and per square mile, and rank of counties.....	51
Table No. 10: Seventeen leading counties in butter shipments, per square mile.	53
Butter markets.....	54
Table No. 11: Markets of Iowa butter and amounts shipped.....	5
Table No. 12: Pounds of milk received—Pounds of butter made, and how disposed of, by counties.....	59
Milk testing and the Iowa law.....	62
Certified milk testers.....	64
Financial exhibit.....	65
Oleomargarine.....	66
Cheese making in Iowa.....	67
Table No. 13: Product of Iowa cheese factories.....	68
City milk inspection—	
Suggestions to city milk dealers.....	69
Inspection of city milk dealers—List of inspectors.....	71
Record of city milk tests.....	72
Table No. 14: In regard to city milk supply.....	79

APPENDIX.

List of Iowa creameries and skim stations, alphabetically arranged, by counties.....	2
List of Iowa cheese factories, alphabetically arranged, by counties.....	34

PREFACE.

This pamphlet contains a list of the creameries and skim stations, together with a list of the cheese factories, which have been reported as doing business in the state, up to November 1, 1898. The many changes of ownership and officers make it very difficult to have the list absolutely accurate, but great pains have been taken in its preparation. The creamery list is a regular feature of the Dairy Commissioner's Annual Report, and the co-operation of all interested in creamery matters is desired, in order that the list may be as nearly correct as possible, for future reports.

Respectfully,

B. P. NORTON,
Dairy Commissioner.

Des Moines, Iowa, November 15, 1898.

CREAMERY LIST.

List of creameries in the state, alphabetically arranged according to counties and town near which creamery is located, together with information pertaining to each.

Office record number.	LOCATED AT OR NEAR.	NAME OF CREAMERY.	Owned by an individual, co-operative, or stock company.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF BUTTER-MAKER.	Separator, bathed cream, or both.	Method of receiving milk or the test of by.	No. of D. O. test bottle.	No. of D. O. bottle.
Adair County											
1	Adair.	Elgin Creamery Co. (S)	Ind	O. Sands, Pres	Chicago, Ill	Orient		Sep'tr	Test.		
2	Adair.	Hebron Creamery Co. (S)	Ind	A. E. Haskell	Hebron, Ill	Orient		Sep'tr	Test.		
3	Adair Hill.	Blue Grass Cr'y Co. (S)	Ind	A. L. Stewart & Co.	Fontanella	Bridgewater	Albert Heyn.	Sep'tr	Test.	1017	
4	Berea.	Blue Grass Cr'y Co. (S)	Ind	A. L. Stewart & Co.	Fontanella	Fontanella		Sep'tr	Test.		
5	Bridgewater.	Blue Grass Cr'y Co. (S)	Ind	A. L. Stewart & Co.	Fontanella	Fontanella		Sep'tr	Test.		
6	Canby.	Blue Grass Cr'y Co. (S)	Ind	A. L. Stewart & Co.	Fontanella	Fontanella		Sep'tr	Test.		
7	Fontanella.		Ind	A. L. Stewart & Co.	Fontanella	Fontanella	W. F. Stewart.	Sep'tr	Test.		
8	Fontanella.		Ind	A. L. Stewart & Co.	Fontanella	Fontanella		Sep'tr	Test.		
9	Greenfield.		Ind	A. E. Haskell	Hebron, Ill	Greenfield		Sep'tr	Test.		
10	Hebron.		Ind	A. E. Haskell	Hebron, Ill	Orient	D. F. Hammers	Sep'tr	Test.		
11	Holiday.		Ind	A. C. Curtis	Chicago, Ill	Orient		Sep'tr	Test.	128	240
12	Hove.		Co-op	A. C. Curtis	Hove, Ill			Sep'tr	Test.		
13	Orient.	Elgin Creamery Co. (S)	Ind	O. Sands, Pres.	Chicago, Ill			Sep'tr	Test.		
Adams County											
14	Cornburg.	Elgin Creamery Co.	Ind	O. Sands, Pres	Chicago, Ill	Cornburg		Sep'tr	Test.	128	
15	Carlton.	Elgin Creamery Co. (S)	Ind	O. Sands, Pres	Chicago, Ill			Sep'tr	Test.	127	
16	Carlton.	Elgin Creamery Co. (S)	Ind	O. Sands, Pres	Chicago, Ill			Sep'tr	Test.		
17	Mercer.	Elgin Creamery Co. (S)	Ind	O. Sands, Pres	Chicago, Ill			Sep'tr	Test.		
18	Nodaway.	Elgin Creamery Co. (S)	Ind	O. Sands, Pres	Chicago, Ill			Sep'tr	Test.		
19	Prescott.	Prescott B. & C. Ass'n		Obas E. Chawgo, Mgr	Prescott, Ill	Prescott	O. E. Chawgo.	Sep'tr	Test.		
20	Williamses.	Prescott B. & C. Ass'n		Obas E. Chawgo, Mgr	Prescott, Ill			Sep'tr	Test.		

Allamakee Count

20	Dorchester ..	Ind...	Sec.	Dorchester ..	New Albany ..	H. J. Foss ..	G. O.	Test.	79
21	Lansing	Co-op.		Church ..	Lansing	Geo. Turner ..	G. O.	Test.	
22	Postville	Co-op.		Postville ..	Postville	Jas. A. Gordon ..	Sep'tr.	Test.	
23	Quandah	Ind...		Quandah	Spring Grove ..	Eng't Langtree ..	G. O.	Test.	
24	Roseville	Co-op.		Roseville	Waterville	T. E. Fair ..	Sep'tr.	Test.	
25	Village Creek ..	Co-op.	A. J. McCafferty, Sec.	Lansing	Lansing	Knute Munson ..	Sep'tr.	Test.	
26	Waterville	Co-op.	Adolph Aaleon ..	Waterville ..	Waterville	Adolph Aaleon ..	G. O.	Test.	
27	Waukon	Co-op.	S. H. Opler, Sec.	Waukon	Waukon	Jackson Smith ..	Sep'tr.	Test.	104
28	Waukon	Co-op.	A. G. Winter, Sec.	Waukon	Waukon	F. A. Flet ..	Sep'tr.	Test.	171
<i>Audubon Count</i>									
29	Audubon	Co-op.	E. Rasmussen, Sec.	Audubon	Audubon	E. Jensen ..	Sep'tr.	Test.	
30	Brayton	Co-op.	J. Nymand, Sec.	Brayton	Brayton	H. Henriksen ..	Sep'tr.	Test.	119
31	Brayton	Co-op.	J. O. Hardmann ..	Brayton	Brayton	J. P. Nelson ..	Sep'tr.	Test.	
32	Extra	Ind...	O. Sands, Pres.	Chicago, Ill.	Extra	H. P. Peterson ..	Sep'tr.	Test.	
33	Extra	Co-op.	H. P. Peterson, Sec.	Extra	Extra	John Nelson ..	Sep'tr.	Test.	
34	Gray	Co-op.	A. P. Hanson ..	Gray	Gray	M. J. Goodnow ..	Sep'tr.	Test.	
35	Hamlin	Co-op.	Louis Grotoluschen ..	Hamlin	Hamlin	F. Heleman ..	Sep'tr.	Test.	1012
36	Kimballton	Co-op.	H. A. Percy, Sec.	Kimballton ..	Audubon	O. F. Jensen ..	Sep'tr.	Test.	104
37	Ross	Co-op.	Peter Lykke ..	Audubon	Audubon	H. R. Smith ..	Sep'tr.	Test.	
38	Viola Center ..	Co-op.	J. Shingledacker, Sec.	Audubon	Audubon .....	.....	Sep'tr.	Test.	
39	Viola Center ..	Co-op.	J. Shingledacker, Sec.	Audubon	Audubon .....	.....	Sep'tr.	Test.	
<i>Beaumont Count</i>									
40	Atkins	Stk Co	Geo. Brownlie, Sec.	Atkins	Atkins	O. P. Lake ..	Sep'tr.	Hd.	285
41	Belle Plaine ..	Ind...		Flgin, Ill.	Belle Plaine ..	K. A. Duncalf ..	Sep'tr.	Test.	
42	Blairtown	Ind...		Blairtown ..	Blairtown ..	Urbis Morck ..	Sep'tr.	Test.	409
43	Mt. Auburn	Co-op.		Mt. Auburn ..	Mt. Auburn ..	.....	Sep'tr.	Hd.	
44	Gillespie	Co-op.		La Porte ..	Norway	Wm. Rowse ..	Sep'tr.	Test.	95
45	Norway	Ind...		Norway	Shellsburg ..	.....	Sep'tr.	Test.	
46	Shellsburg ..	Ind...		Shellsburg ..	Shellsburg ..	.....	Sep'tr.	Test.	
47	Shellsburg ..	Ind...		Shellsburg ..	Shellsburg ..	.....	Sep'tr.	Test.	
48	Urbana	Co-op.		Urbana	Center Point ..	Milton Briggs ..	Sep'tr.	Test.	125
49	Van Horn ..	Co-op.		Van Horn ..	Van Horn ..	.....	Sep'tr.	Test.	197
50	Vinton	Ind...		Vinton	Vinton .....	.....	Sep'tr.	Test.	286
51	Walford	Co-op.		Walford	Walford	Homer Barber ..	G. O.	Test.	
52	Watkins	Co-op.		Watkins	Watkins	V. W. Kumpf ..	Sep'tr.	Test.	145
	Watkins	Co-op.		Watkins	Watkins	E. S. McDonald ..	Sep'tr.	Test.	1573

* Stkm Stations.

CREAMERY LIST—CONTINUED.

Bremer County.		Buchanan County.	
72	Ariclan.	72	Ariclan.
80	Bremer.	80	Bremer.
81	Daver.	81	Daver.
82	Frederika.	82	Frederika.
83	Grovehill.	83	Grovehill.
84	Horton.	84	Horton.
85	Janesville.	85	Janesville.
86	Klinger.	86	Klinger.
87	Knitzel.	87	Knitzel.
88	Maxfield.	88	Maxfield.
89	Mink er.	89	Mink er.
90	Plainsfield.	90	Plainsfield.
91	Sumner.	91	Sumner.
92	Sumner.	92	Sumner.
93	Sumner.	93	Sumner.
94	Sumner.	94	Sumner.
95	Sumner.	95	Sumner.
96	Sumner.	96	Sumner.
97	Sumner.	97	Sumner.
98	Tripoli.	98	Tripoli.
99	Tripoli.	99	Tripoli.
100	Tripoli.	100	Tripoli.
101	Tripoli.	101	Tripoli.
102	Wapete.	102	Wapete.
103	Waverly.	103	Waverly.
104	Waverly.	104	Waverly.
La Fayette Cr'y Co.		La Fayette Cr'y Co.	
Elliott & Speed.		Elliott & Speed.	
W. W. Bain.		W. W. Bain.	
E. Sanborn, Sec.		E. Sanborn, Sec.	
E. R. Prindle, Sec.		E. R. Prindle, Sec.	
A. G. Brown, Sec.		A. G. Brown, Sec.	
W. W. Wilde.		W. W. Wilde.	
W. H. Plank.		W. H. Plank.	
Aurora.		Aurora.	
Brandon.		Brandon.	
Fairbank.		Fairbank.	
Hazelton.		Hazelton.	
Independence.		Independence.	
Jesup.		Jesup.	
Lamont.		Lamont.	
Oterville.		Oterville.	
Quakeston.		Quakeston.	
Rowley.		Rowley.	
Stanley.		Stanley.	
Vista.		Vista.	
Walker.		Walker.	
Winthrop.		Winthrop.	
Aurora.		Aurora.	
Mt. Auburn.		Mt. Auburn.	
Fairbank.		Fairbank.	
Hazelton.		Hazelton.	
Independence.		Independence.	
Jesup.		Jesup.	
Lamont.		Lamont.	
Oterville.		Oterville.	
Winthrop.		Winthrop.	
Rowley.		Rowley.	
Stanley.		Stanley.	
Independence.		Independence.	
Walker.		Walker.	
Winthrop.		Winthrop.	

* Manufacture both butter and cheese.

* Grain stations.

CREAMERY LIST—CONTINUED.

ADDRESS PROPERTY- H, SMOKE- ANY OR MANAGER.	SHIPPING STATION.	NAMES OF BUTTER-MAKERS.	Method of receiv- ing milk - by the test or by bottle.	No. of D. O. test	No. of D. O. pi-
thrup	Winthrop	D. E. Coffin ..	Sep't'r ..	143	143
thrup	Winthrop	D. E. Coffin ..	Sep't'r ..	144	144
Alta	Alta	E. K. Guernsey ..	Sep't'r ..	145	145
Marathon ..	Marathon ..	P. O. Lindstrom ..	Sep't'r ..	146	146
Marathon ..	Marathon ..	J. A. Smith ..	Sep't'r ..	147	147
Marathon ..	Marathon ..	P. O. Flanagan ..	Sep't'r ..	148	148
Marathon ..	Marathon ..	O. H. Jordan ..	Sep't'r ..	149	149
Marathon ..	Marathon ..	E. D. Peck ..	Sep't'r ..	150	150
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	151	151
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	152	152
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	153	153
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	154	154
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	155	155
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	156	156
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	157	157
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	158	158
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	159	159
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	160	160
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	161	161
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	162	162
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	163	163
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	164	164
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	165	165
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	166	166
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	167	167
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	168	168
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	169	169
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	170	170
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	171	171
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	172	172
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	173	173
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	174	174
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	175	175
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	176	176
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	177	177
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	178	178
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	179	179
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	180	180
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	181	181
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	182	182
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	183	183
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	184	184
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	185	185
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	186	186
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	187	187
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	188	188
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	189	189
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	190	190
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	191	191
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	192	192
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	193	193
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	194	194
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	195	195
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	196	196
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	197	197
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	198	198
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	199	199
Marathon ..	Marathon ..	John Lange ..	Sep't'r ..	200	200

149	Prosper...	Stk Co	H. Lehmann, Sec.	Proper	Nashua...	W. J. Simmons.	Sep'tr	Test...	945
149	Shell Rock...	Stk Co	T. M. Sheppard, Sec.	Shell Rock...	Shell Rock	J. Richardson	Sep'tr	Test...	50
150	Elm Grove...	Ind.	E. L. Beard	Decorah	Parkersburg	Franklin Rea.	Sep'tr	Test...	1088
151	Waverly...	Co-op.	E. E. Philo.	New Hartford	N. W. Hartford	O. F. Conbat	Sep'tr	Test...	1287
152	Victory Co-op. Cr'y	Co-op	J. M. Ossa, Sec.	Waverly	Shell Rock	W. H. Woodcock	Sep'tr	Test...	304
Calhoun Coun. 1/2.									
153	Churdan...	Ind.	Benner Bros.	Grand Junc't'n	Jefferson		Sep'tr	Test...	
154	Grandall...	Ind.	R. F. Bewick.	Fonda	Fonda		Sep'tr	Test...	311
155	Elm Grove...	Ind.	Parker & Fitzsimons.	Auburn			Sep'tr	Test...	608
156	Lohrville...	Ind.	Benner Bros.	Grand Junc't'n			Sep'tr	Test...	
157	Manson...	Ind.	G. E. Moon.	Manson	Manson	G. B. Moon...	Sep'tr	Test...	
158	Manson...	Ind.	G. I. Garner, Mgr.	Manson			Sep'tr	Test...	
159	Pomeroy...	Co-op	C. J. Harding, Sec.	Pomeroy	Pomeroy	Olene Olson...	Sep'tr	Hd....	323
160	Pomeroy...	Stk Co	L. S. Hanson, Sec.	Rusk	Pomeroy	N. J. Nelson	Sep'tr	Test...	
161	Pomeroy...	Co-op.	Butler Center				Sep'tr	Test...	
162	Pomeroy...	Co-op.	Creamey Co.				Sep'tr	Test...	
163	Pomeroy...	Co-op.	H. A. Albrecht, Sec.	Pomeroy	Knocke	E. E. Dodge	Sep'tr	Test...	1171
164	Rockwell City	Ind.	John Behrends, Sec.	Rockwell City	Pomeroy	L. E. Haven	Sep'tr	Test...	1275
165	Rockwell City Cr'y	Ind.	F. T. Blaw.	Rockwell City	Rockwell Cr'y	F. T. Blaw.	Sep'tr	Test...	248
Carrick Coun'ty.									
166	Arcadia...	Co-op.	William F. Exp. Sec	Arcadia	Arcadia	Christ Pick	Sep'tr	Test...	399
167	Breda...	Ind.		Arcadia	Arcadia	W. Hinners	Sep'tr	Hd....	1088
168	Coon Rapids...	Ind.		Coon Rapids	Dedham	H. L. Felt	Sep'tr	Test...	1087
169	Dedham...	Ind.		Coon Rapids			Sep'tr	Test...	245
170	Glidden...	Ind.		Glidden	Glidden	Carl Reese	Sep'tr	Test...	
171	Halbur...	Ind.		Halbur	Halbur	H. J. Hoelker	Sep'tr	Test...	344
172	Lake City...	Ind.		Lake City	Lake City		Sep'tr	Test...	1126
173	Manning...	Ind.		Manning	Manning	W. F. Miller	Sep'tr	Test...	
174	St. Carmel...	Ind.		Manning	Breda	W. Hibers	Sep'tr	Hd....	
175	Roselle...	Ind.		Arcadia	Halbur	O. Kohorst	Sep'tr	Test...	
176	Templeton...	Co-op.		Roselle	Templeton	C. Wagner	Sep'tr	Test...	
177	Willey...	Stk Co	B. Greenman	Willey	Dedham	W. E. Wise	Sep'tr	Test...	899
Cass County.									
178	Atlantic...	Ind.	O. Sands, Pres	Chicago, Ill.	Atlantic	Louis Schack	Sep'tr	Test...	
179	Benton Center	Ind.	O. Sands, Pres	Chicago, Ill.			Sep'tr	Test...	
180	Lewis...	Ind.	O. Sands, Pres	Chicago, Ill.			Sep'tr	Test...	
181	Lynna...	Ind.	O. Sands, Pres	Chicago, Ill.			Sep'tr	Test...	
182	Wayne...	Ind.	O. Sands, Pres	Chicago, Ill.			Sep'tr	Test...	
183	Wassons...	Ind.	O. Sands, Pres	Chicago, Ill.			Sep'tr	Test...	
184	Osceola...	Ind.	O. Sands, Pres	Chicago, Ill.			Sep'tr	Test...	

* Blkin Stations.

CREAMERY LIST—CONTINUED.

Office record number	LOCATED AT OR NEAR.	NAME OF CREAMERY.	Owned by an individual, co-operative, or stock company.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF BUTTER-MAKER.	Reparation, gathered cream, or both.	Method of receiving milk—by the test or by the hundred.	No. of D. O. test bottles.	No. of D. O. pi-pette.
Cedar County.											
184	Bennett.....		Ind.	Aug. Hinricks & Co.	Lowden.....	Clarence.....	O. L. Woodling	Sep'tr.....	Hd.....	117	
185	Clarence.....		Ind.	Chr. Singelure.	Galena, Ill.....	Durant.....	Henry Fackl.	S & G. O.	Hd.....		
186	Durant.....		Stk Co.	Chr. Singelure.	Lowden.....			Sep'tr.....	Hd.....	736	
187	Valdard.....		Ind.	Aug. Hinricks & Co.	Lowden.....			Sep'tr.....	Hd.....		
188	Lowden.....		Co-op.	Henry Butts, Sec.	Lowden.....	Bennett.....	W. H. Kroeger.	Sep'tr.....	Hd.....	41	
189	Springdale.....		Ind.	Aug. Hinricks & Co.	West Branch.....			Sep'tr.....	Hd.....		
190	Springdale.....		Ind.	O. G. Eves.	Lowden.....			Sep'tr.....	Hd.....		
191	Springdale.....		Ind.	A. Hinricks & Co.	Lowden.....	Tipton.....		Sep'tr.....	Hd.....		
192	Springdale.....		Ind.	H. L. Deas.	Tipton.....	West Branch.....	O. G. Eves.	Sep'tr.....	Hd.....		
193	West Branch.....	Hopewell Creamery.....	Ind.	O. G. Eves.	West Branch.....						
Cerro Gordo County.											
194	Clear Lake.....		Ind.	G. H. Gurler.	De Kalb, Ill.....	Mason City.....		Sep'tr.....	Test.....	1519	153
195	Mason City.....	Mason City (s).....	Ind.	G. H. Gurler.	De Kalb, Ill.....			Sep'tr.....	Test.....	66	
196	Plymouth.....		Ind.	R. J. Hemphill, Sec.	Portland.....	Portland.....	A. J. Mitchell.	Sep'tr.....	Test.....	156	
197	Portland.....		Stk Co.	W. F. Kuhn.	Rock Falls.....	Rock Falls.....	E. A. Dawson.	Sep'tr.....	Test.....	391	
198	Rock Falls.....		Ind.	George O. Morse, Sec.	Rockford.....	Rockford.....	O. F. Fish.	Sep'tr.....	Test.....		
199	Rock Falls.....		Ind.	Fish & Chelvin	Rockwell.....	Rockwell.....	J. L. Lakina.	Sep'tr.....	Test.....		
200	Rock Falls.....		Co-op.		Rockwell.....	Rockwell.....	J. Gerber.	Sep'tr.....	Test.....	776	79
201	Rockwell.....		Ind.		Thornton.....	Thornton.....		S & G. O.	Test.....		
202	Rockwell.....		Ind.	P. H. Larson.	Miller.....	Ventura.....	Fred Crane.	Sep'tr.....	Test.....		
203	Swaledale.....		Co-op.				Jas Waughdal.				
204	Thornton.....	Model Co-op. Dairy Ass'n.....	Co-op.								
205	Ventura.....										
Cherokee County.											
206	Aurelia.....	Aurelia Creamery.....	Ind.	Knitsey & Watson.	Aurelia.....	Aurelia.....	P. Watson.	Sep'tr.....	Test.....	194	194
207	Baum.....	Meriden Creamery (s).....	Ind.	O. O. Adams.	Meriden.....	Oleghorn.....	Rosa Johnson.	Sep'tr.....	Test.....		
208	Oleghorn.....	Meriden Creamery.....	Ind.	O. O. Adams.	Meriden.....			Sep'tr.....	Test.....		
209	Fielding.....	Marcus Creamery (s).....	Ind.	B. O. Skewis.	Marcus.....	Larrabee.....	A. Younger.	Sep'tr.....	Test.....		
210	Larrabee.....	Larrabee Creamery.....	Ind.	A. Younger.	Larrabee.....			Sep'tr.....	Test.....		

241	Ind	R. O. Skewis	Marcus	Marcus	J. S. Likens	Sep'tr	Test	41
242	Ind	O. O. Adams	Menden	Menden	O. O. Adams	Sep'tr	Test	1081
243	Ind	A. J. Stanford	Quincy	Quincy	H. J. Stanford	Sep'tr	Test	
244	Co-op	P. J. Kennedy	Wash's	Wash's	O. D. Vanhorn	Sep'tr	Test	
245	Co-op	Wm Vick, Mgr	Alta Vista	Alta Vista	O. O. Capper	Sep'tr	Test	55
246	Co-op	E. M. Larrabee, Mgr	Bassett	Bassett	S. Butler	Sep'tr	Test	638
247	Co-op	J. De Ruttenes	Byrd	Byrd	S. Wentworth	Sep'tr	Test	174
248	Co-op	J. W. Kane, Sec	Deerfield	Alta Vista	Obad Mader	Sep'tr	Test	675
249	Co-op	E. P. Sheffield, Sec	New Hampton	Davin	L. H. Talcott	Sep'tr	Test	173
250	Ind	James Campbell	New Hampton	New Hampton	W. Went	Sep'tr	Test	
251	Co-op	Wm. Bee, Sec	Fredricksburg	Fredricksburg	J. H. Clark	Sep'tr	Test	194
252	Co-op	J. W. Ogley, Sec	Ionia	Ionia	P. N. Williams	Sep'tr	Test	168
253	Co-op	Mike Kearney, Sec	Jerico	New Hampton	J. P. Whelan	Sep'tr	Test	886
254	Co-op	H. M. Kout, Sec	Lawler	Lawler	Fred Ziegler	Sep'tr	Test	1375
255	Ind	A. N. Elvidge	Elkader	New Hampton	H. B. Fortney	Sep'tr	Test	1351
256	Co-op	O. E. Pierce, Sec	Nashua	Nashua	G. O.	Sep'tr	Test	
257	Ind	O. L. Purney, Mgr	Nashua	Nashua	Sep'tr	Test	639	
258	Stk Co	E. J. Graham, Mgr	Nashua	Nashua	Sep'tr	Test		
259	Stk Co	E. J. Graham, Mgr	Nashua	Nashua	Sep'tr	Test		
260	Stk Co	E. J. Graham, Mgr	Nashua	Nashua	Sep'tr	Test		
261	Ind	James Campbell	New Hampton	New Hampton	E. H. Richards	Sep'tr	Test	23
262	Co-op	Geo Rudolph, Sec	No Washington	No Washington	R. H. Wallace	Sep'tr	Test	237
263	Ind	James Campbell	New Hampton	New Hampton	A. W. Kaercher	Sep'tr	Test	35
264	Co-op	J. Hall, Sec	Williamstown	Williamstown	Frank Kolthoff	Sep'tr	Test	
265	Ind	O. Sands, Pres.	Chicago, Ill.	Chicago, Ill.	W. K. Loughton	Sep'tr	Test	
266	Ind	O. Sands, Pres.	Chicago, Ill.	Chicago, Ill.		Sep'tr	Test	
267	Ind	O. Sands, Pres.	Chicago, Ill.	Chicago, Ill.		Sep'tr	Test	
268	Ind	O. Sands, Pres.	Chicago, Ill.	Chicago, Ill.		Sep'tr	Test	
269	Ind	Fred Mohler, Prop.	Woodburn	Woodburn	E. P. Currie	Sep'tr	Test	716
270	Ind		Woodburn	Woodburn	O. O. Mohler	Sep'tr	Test	
271	Ind	G. W. Parsons	Dickens	Dickens		Sep'tr	Test	1059
272	Stk Co	Dickens Ory Co.	Dickens	Dickens		Sep'tr	Test	1053
273	Stk Co	C. Peterson, Mgr	Everly	Everly	S. & G. O.	Sep'tr	Test	26
274	Ind	Frank Elley, Sec	Fosteria	Fosteria	Frank Elley	Sep'tr	Test	124
275	Ind	W. L. Beach	Willow Creek	Peterson	Ira Stewart	Sep'tr	Test	125
276	Co-op	O. M. Varney, Sec	Ruthven			Sep'tr	Test	727
277	Ind	O. B. Ross	Spencer	Spencer	O. B. Ross	Sep'tr	Test	292
278	Ind	E. D. Lauck	Spencer	Spencer		Sep'tr	Test	1147
279	Ind	E. D. Lauck	Spencer	Spencer		Sep'tr	Test	1157

* Skim Station.

CREAMERY LIST—CONTINUED.

Office record number.	LOCATED AT OR NEAR.	NAME OF CREAMERY.	Owned by individuals or operated by stock company.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	Ins. the milk by the hundred bottles.	No. of D. O. C. test.	No. of D. O. C. pette.
<i>Clatsop County.</i>								
249	Communia	Communia Cr'y Ass'n.	Co-op.	George Meyer.	Communia	Littleport	Test.. 759	759
250	Edgewood	Fidelity	Ind.	H. F. Beyer.	Edgewood	Edgewood	Test.. 285	285
251	Elkader	Highland Cr'y Ass'n.	Co-op.	H. O. Elridge, Sec.	Elkader	Elkader	Test.. 189	189
252	Elkader	Elkader	Ind.	H. F. Beyer.	Edgewood	Elkader	Test.. 1220	1220
253	Elkader	Elkader	Ind.	H. F. Beyer.	Edgewood	Elkader	Test.. 1220	1220
254	Elkader	Elkader	Ind.	H. F. Beyer.	Edgewood	Elkader	Test.. 1220	1220
255	Farmersburg	Farmersburg Cr'y Ass'n.	Co-op.	John Johnson, Sec.	Farmersburg	Farmersburg	Test.. 1168	1168
256	Gard	Gard	Co-op.	E. W. Kregel.	Gard	Gard	Test.. 1168	1168
257	Gard	Gard	Co-op.	E. W. Kregel.	Gard	Gard	Test.. 1168	1168
258	Gard	Gard	Co-op.	E. W. Kregel.	Gard	Gard	Test.. 1168	1168
259	Gard	Gard	Co-op.	E. W. Kregel.	Gard	Gard	Test.. 1168	1168
260	Gard	Gard	Co-op.	E. W. Kregel.	Gard	Gard	Test.. 1168	1168
261	Gard	Gard	Co-op.	E. W. Kregel.	Gard	Gard	Test.. 1168	1168
262	Gard	Gard	Co-op.	E. W. Kregel.	Gard	Gard	Test.. 1168	1168
263	Gard	Gard	Co-op.	E. W. Kregel.	Gard	Gard	Test.. 1168	1168
264	Gard	Gard	Co-op.	E. W. Kregel.	Gard	Gard	Test.. 1168	1168
265	Gard	Gard	Co-op.	E. W. Kregel.	Gard	Gard	Test.. 1168	1168
266	Gard	Gard	Co-op.	E. W. Kregel.	Gard	Gard	Test.. 1168	1168
267	Gard	Gard	Co-op.	E. W. Kregel.	Gard	Gard	Test.. 1168	1168
268	Gard	Gard	Co-op.	E. W. Kregel.	Gard	Gard	Test.. 1168	1168
269	Gard	Gard	Co-op.	E. W. Kregel.	Gard	Gard	Test.. 1168	1168
270	Gard	Gard	Co-op.	E. W. Kregel.	Gard	Gard	Test.. 1168	1168
271	Gard	Gard	Co-op.	E. W. Kregel.	Gard	Gard	Test.. 1168	1168
272	Gard	Gard	Co-op.	E. W. Kregel.	Gard	Gard	Test.. 1168	1168
273	Gard	Gard	Co-op.	E. W. Kregel.	Gard	Gard	Test.. 1168	1168
274	Gard	Gard	Co-op.	E. W. Kregel.	Gard	Gard	Test.. 1168	1168
275	Gard	Gard	Co-op.	E. W. Kregel.	Gard	Gard	Test.. 1168	1168
276	Gard	Gard	Co-op.	E. W. Kregel.	Gard	Gard	Test.. 1168	1168

277	Lost Nation, 19	Diamond Cr'y Co. (s)	Ind...	Simpson, Mcl & Co...	Boston, Mass.	.....	Sep'tr..	Test.	1088
278	Lost Nation, 22	Diamond Cr'y Co. (s)	Ind...	Simpson, Mcl & Co...	Boston, Mass.	.....	Sep'tr..	Test.	
279	Lost Nation, 28	Diamond Cr'y Co. (s)	Ind...	Simpson, Mcl & Co...	Boston, Mass.	.....	Sep'tr..	Test.	
280	Low Moor	Springbrook Creamery	Ind...	John Newman Co.	Elgin, Ill.	Low Moor	Sep'tr..	S & G.O.	
281	Quincy	Springbrook Creamery	Ind...	John Newman Co.	Elgin, Ill.	Quincy	Sep'tr..	Test.	
282	Quincy	Springbrook Creamery	Ind...	John Newman Co.	Elgin, Ill.	Quincy	Sep'tr..	Test.	
<i>Crawford County</i>									
283	Applawall	Hayes Township Cr'y (s)	Ind...	W. H. Prater, Jr.	West Side	.....	Sep'tr..	Test.	1120
284	Charter Oak	Charter Oak Cr'y Co.	Co-op	J. C. Shuster, Sec	Charter Oak	.....	Sep'tr..	Test.	1120
285	Denison	Denison Creamery (s)	Ind...	C. A. Murray	Denison	.....	Sep'tr..	Test.	114
286	Denison	Denison Creamery (s)	Ind...	C. A. Murray	Denison	.....	Sep'tr..	Test.	
287	Denison	Denison Creamery (s)	Ind...	C. A. Murray	Denison	.....	Sep'tr..	Test.	
288	Mailla	Hayes Township Cr'y	Ind...	W. H. Prater, Jr.	West Side	Mailla	Sep'tr..	Test.	
289	Mailla	Hayes Township Cr'y	Ind...	W. H. Prater, Jr.	West Side	Mailla	Sep'tr..	Test.	
290	West Side	Hayes Township Cr'y	Ind...	W. H. Prater	West Side	West Side	Sep'tr..	Hd.	668
<i>Dallas County</i>									
291	Adel	MacRae Bros Cr'y (s)	Ind...	MacRae Bros	Des Moines	.....	Sep'tr..	Test.	1778
292	Dallas Center	MacRae Bros Cr'y (s)	Ind...	MacRae Bros	Dallas Center	.....	Sep'tr..	Hd.	922
293	Denison	MacRae Bros Cr'y (s)	Ind...	MacRae Bros	Denison	.....	Sep'tr..	Test.	1288
294	Dexter	MacRae Bros Cr'y (s)	Ind...	MacRae Bros	Dexter	.....	Sep'tr..	Test.	180
295	London	MacRae Bros Cr'y (s)	Ind...	MacRae Bros	London	.....	Sep'tr..	Test.	
296	Minburn	MacRae Bros Cr'y (s)	Ind...	MacRae Bros	Minburn	.....	Sep'tr..	Test.	
297	Panther	MacRae Bros Cr'y (s)	Ind...	MacRae Bros	Panther	.....	Sep'tr..	Test.	
298	Perry	MacRae Bros Cr'y (s)	Ind...	MacRae Bros	Perry	.....	Sep'tr..	Hd.	1588
299	Perry	MacRae Bros Cr'y (s)	Ind...	MacRae Bros	Perry	.....	Sep'tr..	Test.	281
300	Wauke	MacRae Bros Cr'y (s)	Ind...	MacRae Bros	Wauke	.....	Sep'tr..	Test.	120
301	Woodward	MacRae Bros Cr'y (s)	Ind...	MacRae Bros	Woodward	.....	Sep'tr..	Test.	204
<i>Des Moines County</i>									
302	Bloomfield	Bloomfield Creamery	Ind...	W. H. Davis	Bloomfield	.....	Sep'tr..	Test.	780
303	Drakeville	Bloomfield Creamery (s)	Ind...	W. H. Davis	Bloomfield	.....	Sep'tr..	Test.	
304	Florida	G. B. Caldwell & Son	Ind...	G. B. Caldwell & Son	Florida	.....	Sep'tr..	Test.	126
305	Pulaski	Pulaski Creamery	Ind...	J. J. Miller	Pulaski	.....	Sep'tr..	G. O.	94
<i>Deer Creek County</i>									
306	Grand River	Grand River Creamery	Ind...	T. G. Hyde	Grand River	.....	Sep'tr..	Test.	
307	Lamoni	Lamoni Creamery	Ind...	I. W. Alexander, Sec.	Lamoni	.....	Sep'tr..	Test.	
308	Le Roy	Wayne County Cr'y (s)	Ind...	T. G. Hyde	Wayne County	.....	Sep'tr..	Test.	

* Manufacture both butter and cheese.

* Skim Stations.

CREAMERY LIST—CONTINUED.

Office record number.	LOCATED AT OR NEAR.	NAME OF CREAMERY.	Owned by an individual, co-operative, or stock company.	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF BUTTER-MAKER.	Separator, bath, or both.	Method of receiving milk—by the hundred or by the test.	No. of D. C. test bottle.	No. of D. C. plate.
<i>Delaware County.</i>										
309	Almora.	Almora Creamery.	Co-op.	Almora.	Almora Sta.	F. A. Parkin.	Sept'r	Test.	114	
310	Colesburg.	Colesburg Creamery Co.	Co-op.	Colesburg.	Oxford	A. L. Landis.	Sept'r	Test.	125	
311	Delaware.	Delaware Creamery Co.	Co-op.	Delaware.	Delaware	P. F. Madden.	Sept'r	Test.	125	125
312	Delhi.	Silver Spring Ory Co.	Ind.	Delhi.	Delhi.	Chas. Howard.	Sept'r	Test.	1205	125
313	Dundee.		Ind.	Edgewood.	Dundee		Sept'r	Test.	1205	125
314	Earville.		Ind.	Earville.	Earville		Sept'r	Test.	1205	125
315	Earville.		Ind.	Earville.	Earville		Sept'r	Test.	1205	125
316	Earville.		Ind.	Earville.	Earville		Sept'r	Test.	1205	125
317	Greely.		Co-op.	Greely.	Greely	F. J. Kleckner.	Sept'r	Test.	...	245
318	Hazel Green.		Ind.	Hazel Green.	Ryan.	W. F. Kuey.	Sept'r	Test.	...	245
319	Hazel Green.		Ind.	Hazel Green.	Ryan.	Lee McNairland.	Sept'r	Test.	...	245
320	Hazel Green.		Ind.	Hazel Green.	Ryan.	F. L. Houska.	Sept'r	Test.	...	245
321	Hopkinton.		Ind.	Hopkinton.	Hopkinton.	C. A. Biddle.	Sept'r	Test.	322	
322	Hopkinton.		Co-op.	Hopkinton.	Hopkinton.	J. H. Grimth.	Sept'r	Test.	370	
323	Manchester.		Co-op.	Delaware.	Manchester.	A. A. Palmer.	Sept'r	Test.	784	45
324	Manchester.		Co-op.	Barryville.	Manchester.	W. S. Smarso.	Sept'r	Test.	784	45
325	Manchester.		Co-op.	Manchester.	Manchester.	U. H. Mider.	Sept'r	Test.	740	
326	Masonville.		Ind.	Masonville.	Masonville.	H. W. Schure.	Sept'r	Test.	1010	
327	Masonville.		Ind.	Masonville.	Masonville.	H. N. Kenyon.	Sept'r	Test.	...	
328	Masonville.		Ind.	Masonville.	Masonville.	Corwin Cross.	Sept'r	Test.	1145	207
329	Onida.		Ind.	Onida.	Onida.	Matt McDowell.	Sept'r	Test.	641	
330	Petersburg.		Co-op.	Petersburg.	Dyersville.	Jacob S. Schmidt.	Sept'r	Test.	...	
331	Petersburg.		Co-op.	Petersburg.	Dyersville.	Frank Baby.	Sept'r	Test.	...	
332	Ryan.		Co-op.	Hazel Green.	Ryan.		Sept'r	Test.	115	
333	Ryan.		Ind.	Amits.	Ryan.		Sept'r	Test.	...	
334	Ryan.		Ind.	Hazel Green.	Ryan.	Fred Miller.	Sept'r	Test.	...	
335	Sand Spring.		Co-op.	Sand Spring.	Sand Spring.	Ollie Wright.	Sept'r	Test.	...	
336	Silver Creek.		Ind.	Silver Creek.	Ryan.	H. Williams.	Sept'r	Test.	94	20
337	Thorpe.		Ind.	Edgewood.	Edgewood	Geo. E. Packer.	Sept'r	Test.	72	201
338	Thorpe.		Ind.	Edgewood.	Edgewood	W. K. Pallard.	Sept'r	Test.	...	
339	Worthington.		Co-op.	Worthington.	Hopkinton.	H. F. Lehmkuhl.	Sept'r	Test.	...	

340	Ind...	Millford...	Millford...	Sep'tr...	Test...	248
341	8th Co	Millford...	Millford...	Sep'tr...	Test...	118
342	Ind...	Spirit Lake...	Spirit Lake...	Sep'tr...	Test...	670
343	Co-op.	Terril...	Millford...	Sep'tr...	Test...	141
344	Co-op.	Baltown...	Wanpeton...	Sep'tr...	Hd.	
345	Co-op.	Cascade...	Cascade...	Sep'tr...	Test...	1234
346	Ind...	Cascade...	Cascade...	Sep'tr...	Test...	1128
347	8th Co	Dyersville...	Dyersville...	Sep'tr...	Test...	150
348	Co-op.	Dyersville...	Dyersville...	Sep'tr...	Hd.	1128
349	Co-op.	Epworth...	Epworth...	Sep'tr...	Hd.	148
350	Co-op.	Epworth...	Epworth...	Sep'tr...	Test...	676
351	Ind...	Farley...	Farley...	Sep'tr...	Test...	550
352	Ind...	Farley...	Farley...	Sep'tr...	Hd.	303
353	Co-op.	Farley...	Farley...	Sep'tr...	Hd.	
354	8th Co	Fillmore...	Fillmore...	Sep'tr...	Hd.	
355	Co-op.	Fillmore...	Fillmore...	Sep'tr...	Hd.	302
356	Co-op.	Fillmore...	Fillmore...	Sep'tr...	Test...	
357	8th Co	Loke...	Loke...	Sep'tr...	Test...	245
358	Ind...	Loke...	Loke...	Sep'tr...	Hd.	210
359	8th Co	New Vienna...	Dyersville...	Sep'tr...	Hd.	228
360	Ind...	Pecota...	Pecota...	Sep'tr...	Hd.	
361	Co-op.	Pecota...	Pecota...	Sep'tr...	Hd.	
362	Co-op.	Richardville...	Danisco...	Sep'tr...	Hd.	301
363	Ind...	Richardville...	Danisco...	Sep'tr...	Test...	
364	Co-op.	Richardville...	Danisco...	Sep'tr...	Hd.	
365	Ind...	Rockdale...	Danisco...	Sep'tr...	Test...	
366	Co-op.	Rockdale...	Danisco...	Sep'tr...	Hd.	
367	8th Co	Sherrill...	Specht's Ferry...	Sep'tr...	Test...	759
368	Co-op.	Sherrill...	Specht's Ferry...	Sep'tr...	Hd.	
369	Ind...	Dyersville...	Worthington...	Sep'tr...	Test...	
370	Co-op.	Dyersville...	Worthington...	Sep'tr...	Hd.	
371	Ind...	Worthington...	Worthington...	Sep'tr...	Test...	
372	Ind...	Worthington...	Worthington...	Sep'tr...	Hd.	
373	Ind...	Zwingie...	Zwingie...	Sep'tr...	Test...	
367	8th Co	Armstrong...	Armstrong...	Sep'tr...	Test...	526
368	Co-op.	Armstrong...	Armstrong...	Sep'tr...	Test...	1280
369	Ind...	Armstrong...	Armstrong...	Sep'tr...	Test...	1285
370	Co-op.	Batherville...	Batherville...	Sep'tr...	Test...	244
371	Co-op.	Batherville...	Batherville...	Sep'tr...	Test...	
372	Co-op.	Batherville...	Batherville...	Sep'tr...	Test...	
373	Co-op.	Batherville...	Batherville...	Sep'tr...	Test...	
374	Co-op.	Wallingford...	Wallingford...	Sep'tr...	Test...	210
375	Ind...	Wallingford...	Wallingford...	Sep'tr...	Test...	
376	Co-op.	Wallingford...	Wallingford...	Sep'tr...	Test...	
377	Ind...	Wallingford...	Wallingford...	Sep'tr...	Test...	
378	Co-op.	Wallingford...	Wallingford...	Sep'tr...	Test...	
379	Ind...	Wallingford...	Wallingford...	Sep'tr...	Test...	
380	Co-op.	Wallingford...	Wallingford...	Sep'tr...	Test...	
372	Co-op.	Alpha...	Waucoma...	Sep'tr...	Test...	98
373	Ind...	Alpha...	Waucoma...	Sep'tr...	Test...	
374	Co-op.	Alpha...	Waucoma...	Sep'tr...	Test...	676
375	Ind...	Alpha...	Waucoma...	Sep'tr...	Test...	734
376	Co-op.	Alpha...	Waucoma...	Sep'tr...	Test...	
377	Ind...	Alpha...	Waucoma...	Sep'tr...	Test...	
378	Co-op.	Alpha...	Waucoma...	Sep'tr...	Test...	
379	Ind...	Alpha...	Waucoma...	Sep'tr...	Test...	
380	Co-op.	Alpha...	Waucoma...	Sep'tr...	Test...	

444	Alexander...	Ind...	G. H. Gurler...	Ind...	Alexander...	Sept'r...	Test...	1200	147
445	Chaplin...	Co-op	G. H. Gurler...	Ind...	Chaplin...	S. & G. O.	Test...	1240	
446	Dows...	Ind...	G. H. Meade, Sec.	Ind...	Dows...	J. N. Rosson...	Test...		
447	Faulkner...	Ind...	J. Martin & Son	Ind...	Hampton...	G. O.	Test...	1210	145
448	Hampton...	Ind...	A. Juhl...	Ind...	Hampton...	Jake Juhl...	Test...		
449	Latimer...	Co-op	L. C. Cochran...	Ind...	Latimer...	L. C. Cochran...	Test...		
450	Latimer...	Co-op	Fred Rodemeyer, Sec.	Co-op	Latimer...	Wm. Kuritz...	Test...		
451	Latimer...	Co-op	Fred Rodemeyer, Sec.	Co-op	Latimer...	Geo. Jorgensen...	Test...		
452	Popejoy...	Co-op	Geo. W. Russell...	Co-op	Popejoy...	W. A. Baker...	Test...		
453	Shedfield...	Co-op	W. D. Parker...	Co-op	Shedfield...	Calvin Triplett...	Test...	126	
Greene County									
454	Adams...	Co-op	M. M. Reading...	Ind...	Adams...	D. E. Whitney...	Test...	798	
455	Cooper...	Ind...	Kennner Bros.	Ind...	Adams...		Test...		
456	Dana...	Co-op	J. A. Rowles, Sec.	Ind...	Dana...				
457	Farlin...	Ind...	M. A. Nugent...	Ind...	Farlin...	W. H. Maloy...	Test...	844	120
458	Grand Junction	Ind...	Kennner Bros.	Ind...	Grand June...	Wm. Adams...	Test...	1126	
459	Jefferson...	Ind...	Kennner Bros.	Ind...	Jefferson...	H. W. Huber...	Test...	877	
460	Faton...	Ind...	Geo. E. White...	Ind...	Faton...	Geo. E. White...	Test...	894	
461	Ripley...	Ind...	H. D. Remington...	Ind...	Ripley...	E. Tuttle...	Test...	122	
462	Scranton...	Co-op	W. S. Fey...	Co-op	Scranton...	W. S. Fey...	Test...		
Grundy County									
463	Ackley...	Ind...	J. U. Johnson...	Ind...	Ackley...	Theo. Newman...	Ed...	786	
464	Applington...	Ind...		Ind...	Applington...		Test...	1241	113
465	Beaman...	Ind...		Ind...	Beaman...	P. McNally...	Test...	1128	111
466	Conrad...	Ind...		Ind...	Conrad...		Test...	126	
467	Dairyville...	Ind...		Ind...	N. Hartford...	Geo. Graham...	Test...	124	
468	Fredsville...	Co-op		Co-op	Cedar Falls...	A. K. Smith...	Test...	124	123
469	Grundy Center	Ind...		Ind...	Grundy Cent	George Norton...	Test...	328	
470	Grundy Center	Ind...		Ind...	Grundy Cent	Louis Cedar...	Test...		
471	Holland...	Ind...		Ind...	Grundy Cent		Test...	847	
472	Holland...	Ind...		Ind...	Grundy Cent	Peer Larson...	Test...		
473	Freder...	Co-op		Co-op	Holland...	V. Churchill...	Test...	971	127
474	Lincoln...	Ind...		Ind...	Edora...	E. K. Farr...	Test...	1241	12
475	Norison...	Ind...		Ind...	Morrison...	G. H. Patrick...	Test...	1148	
476	New Hartford...	Co-op		Co-op	N. Hartford...	P. Sherman...	Test...		
477	Reinbeck...	Ind...		Ind...	Reinbeck...	W. H. Schelber...	Test...	860	127
478	Reinbeck...	Co-op		Co-op	Reinbeck...	R. Jensen...	Test...		
479	Reinbeck...	Ind...		Ind...	Reinbeck...	G. Place...	Test...		
480	Reinbeck...	Ind...		Ind...	Reinbeck...	W. F. Graham...	Test...		
481	Weisburg...	Ind...		Ind...	Weisburg...		Test...		

* Manufacture both butter and cheese.

§ Slim Stations.

CREAMERY LIST—CONTINUED.

		Individual, co-operative, or stock company.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF BUTTER-MAKER.	Separator, washed cream, or both.	Method of receiving milk or by the hundred.	No. of D. O. test bottles.	No. of D. O. bottles.
Guthrie County.										
443	Bagley	Ind	Silver Lake Cream'ry (6)	Andrew Wood	Guthrie Center	.....	Sep'tr	Test.	.....	.....
444	Bayard	Ind	Silver Lake Cream'ry (6)	Andrew Wood	Guthrie Center	.....	Sep'tr	Test.	.....	.....
445	Casey	Ind	Elgin Creamery Co. (6)	O. Sands, Pres	Chicago, Ill.	.....	Sep'tr	Test.	1001	.....
446	Dale City	Ind	Silver Lake Cream'ry (6)	Andrew Wood	Guthrie Center	.....	Sep'tr	Test.	1002	.....
447	Guthrie Center	Ind	Silver Lake Cream'ry (6)	Andrew Wood	Guthrie Center	.....	Sep'tr	Test.	.....	.....
448	North Branch	Ind	Silver Lake Cream'ry (6)	Andrew Wood	Guthrie Center	.....	Sep'tr	Test.	.....	.....
449	North Adair	Ind	Elgin Creamery Co. (6)	O. Sands, Pres	Chicago, Ill.	.....	Sep'tr	Test.	.....	.....
450	Menlo	Stk Co	Menlo Creamery Co	A. C. Curtis	Menlo	.....	Sep'tr	Test.	1144	120
451	Panora	Ind	Wilcox Creamery	F. F. Wilcox	Panora	.....	Sep'tr	Test.	1518	151
452	Stuart	Or-op	Stuart Co-op Creamery	Joe Sincake, Sec.	Stuart	.....	Sep'tr	Test.	1004	.....
453	Wichita	Ind	Silver Lake Cream'ry (6)	Andrew Wood	Guthrie Center	.....	Sep'tr	Test.	.....	.....
454	Yale	Ind	Park & Sons.	.....	Yale	.....	Sep'tr	Test.	1149	.....
Henderson County.										
455	Blairburg	Co-op	Blairburg Co-op. Cr'y	B. M. Merrill, Sec.	Blairburg	.....	Sep'tr	Test.	1225	130
456	Elsworth	Co-op	M. H. Brinton, Sec.	.....	Elsworth	.....	Sep'tr	Test.	.....	.....
457	Jewell	Ind	H. E. Gronbeck	.....	Jewell	.....	Sep'tr	Test.	25	.....
458	Kamar	Ind	A. O. Blaw	.....	Kamar	.....	Sep'tr	Test.	.....	.....
459	Poplar Grove	Ind	Geo. G. Howard	.....	Poplar Grove	.....	Sep'tr	Test.	.....	.....
460	Randall	Co-op	Jens Olsson, Sec.	.....	Randall	.....	Sep'tr	Test.	.....	.....
461	Stanhope	Ind	N. C. Blaw	.....	Stanhope	.....	Sep'tr	Test.	247	.....
462	Stantford	Ind	J. H. Daniels	.....	Stantford	.....	Sep'tr	Test.	.....	.....
463	Webster City	Stk Co	A. P. France, Pres.	.....	Webster City	.....	Sep'tr	Test.	.....	.....
464	Webster City	Stk Co	P. Knudsen, Sec.	.....	Webster City	.....	Sep'tr	Test.	.....	.....
465	Williams	Co-op	M. H. Brinton, Sec.	.....	Williams	.....	Sep'tr	Test.	1225	.....
466	Williams	Ind	F. E. Payne	.....	Williams	.....	Sep'tr	Test.	.....	.....
Hemlock County.										
467	Britt	Co-op	Crystal Creamery Co.	J. C. Nelson, Sec.	Britt	.....	Sep'tr	Test.	.....	108
468	Britt	Co-op	Britt Co-op Cr'y Co.	J. C. Nelson, Sec.	Britt	.....	Sep'tr	Test.	.....	108
469	Britt	Ind	Britt Dairy B. & C.	Geo. P. Hardwick	Britt	.....	Sep'tr	Test.	.....	.....

466	Corwith.....	Co-op.	R. P. Drennon, Mgr.	Corwith.....	Corwith.....	Sept'r	Test..	1177	29
467	Duncan.....	Co-op.	John Schuman, Sec.	Duncan.....	Duncan.....	Sept'r	Test..	1215	135
468	Forest City....	Co-op.	W. W. Wright, Sec.	Forest City....	Forest City....	Sept'r	Test..	1248	87
469	Garner.....	Co-op.	H. C. Schmitt, Sec.	Garner.....	Ventura.....	Sept'r	Test..	1247	
470	Goodell.....	Ind.	E. M. Lamon	Belmond.....	Klemme.....	G. O.	Test..		
471	Klemme.....	Co-op.	Louis Sampson, Sec.	Klemme.....	Klemme.....	Sept'r	Test..		
472	Miller.....	Co-op.	P. H. Larson, Mgr.	Miller.....	Goodell.....	Sept'r	Test..	1189	97
473	West Lake.....	Co-op.	A. A. Lahn, Sec.	West Lake.....	Goodell.....	Sept'r	Test..		
<i>Hardin County</i>									
477	Alden.....	Co-op.	E. L. Bollisho	Alden.....	Alden.....	Sept'r	Test..	1202	115
478	Oleves.....	Ind.		Oleves.....	Oleves.....	Sept'r	Test..		
479	Eldora.....	Ind.		Eldora.....	Hubbard.....	Sept'r	Test..	1200	126
480	Hubbard.....	Co-op.		Hubbard.....	Hubbard.....	Sept'r	Test..	1165	29
481	Iowa Falls.....	Ind.		Iowa Falls.....	Iowa Falls.....	Sept'r	Test..	1220	102
482	New Providence	Co-op.	G. L. Whinery	Iowa Falls.....	Iowa Falls.....	Sept'r	Test..	1046	16
483	Radcliffe.....	Stk Co	W. T. Karney, Sec.	N. Providence.	Lawn Hill.....	Sept'r	Test..	890	210
484	Radcliffe.....	Co-op.	S. Stenberg, Sec.	Radcliffe.....	Radcliffe.....	Sept'r	Test..	107	
485	Radcliffe.....	Ind.		Radcliffe.....	Radcliffe.....	Sept'r	Test..		
486	Robertson.....	Ind.	Oscar Sampson	Radcliffe.....	Robertson.....	Sept'r	Test..	200	
487	Stambaugh.....	Ind.		Radcliffe.....	Robertson.....	Sept'r	Test..		
488	Union.....	Stk Co		Radcliffe.....	Robertson.....	Sept'r	Test..		
489	Whitten.....	Co-op.	Geo. N. Carr, Sec.	Union.....	Union.....	Sept'r	Test..		
<i>Harrison County</i>									
493	Dunlap.....	Co-op.	F. W. Shellman, Mgr.	Dunlap.....	Dunlap.....	Sept'r	Test..	29	29
494	Magalia.....	Co-op.	F. H. Odwell, Sec.	Logan.....	Logan.....	Sept'r	Test..		
495	Missouri Valley	Ind.	Tillman Bros.	McC. Valley....	McC. Valley....	Sept'r	Test..		
496	Modale.....	Co-op.		Modale.....	Modale.....	Sept'r	Test..		
<i>Henry County</i>									
498	Mt. Pleasant...	Ind.	W. G. Clark.....	Mt. Pleasant...	Mt. Pleasant...	Sept'r	Test..		
499	Trenton.....	Ind.	W. G. Clark.....	Mt. Pleasant...	Mt. Pleasant...	Sept'r	Test..		
500	Wayland.....	Co-op.	N. Rich, Mgr.	Wayland.....	Wayland.....	Sept'r	Test..	68	
501	Winfield.....	Ind.	J. A. Eicher.....	Winfield.....	Winfield.....	Sept'r	Test..	901	

* Manufacture both butter and cheese.

* Skim Stations.

CREAMERY LIST—CONTINUED.

Office record number.	LOCATED AT OR NEAR.	NAME OF CREAMERY.	Owned by stock company, individual, or co-op.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	Be at or cream, or	No. of D. O. pt.
Howard County.							
500	Acme.....	Saratoga Co-op. C. As'n.	Stk Co	Bert Stevens.....	Acme.....	Lowther.....	Sept
501	Bonair.....		Ind.....	A. O. Elvidge.....	Elkader.....	Obester.....	S. & G
502	Chester.....		Co-op.	A. O. Greene.....	Chester.....	Oreco.....	S. & G
503	Oreco.....		Ind.....	W. B. Owen.....	Oreco.....	Elma.....	Sept
504	Elma.....		Co-op.	A. A. Carter.....	Elma.....	Lime Springs.....	S. & G
505	Lime Springs.....		Ind.....	A. O. Elvidge.....	Elkader.....	Oreco.....	S. & G
506	Lourdes.....		Ind.....	W. B. Owen.....	Oreco.....	Oreco.....	S. & G
507	Proville.....		Co-op.	J. J. Luke, Sec.....	Proville.....	Proville.....	S. & G
508	Riceville.....		Co-op.	August Schimming.....	Saratoga.....	Riceville.....	S. & G
Humboldt County.							
509	Bode.....	Bode Creamery Assn.	Co-op.	C. A. Rosaling, Sec.....	Bode.....	Bode.....	Sept
510	Bradgate.....		Co-op.	J. L. Van Horn.....	Bradgate.....	Bradgate.....	Sept
511	Grove.....		Co-op.	F. D. Arnold, Sec.....	Humboldt.....	Arnold Sta.....	Sept
512	Hardy.....		Ind.....	McMurry Bros.....	Goldfield.....	Arnold Sta.....	Sept
513	Humboldt.....		Co-op.	G. L. Grullichbank, S.....	Humboldt.....	Humboldt.....	S. & G
514	Ottoen.....		Co-op.	G. J. Clark, Sec.....	Ottoen.....	Ottoen.....	Sept
515	Renwick.....		Co-op.	Aug. Grubel, Sec.....	Renwick.....	Renwick.....	Sept
516	Rutland.....		Co-op.	W. J. Brown, Sec.....	Rutland.....	Rutland.....	Sept
517	Thor.....		Stk Co	Lewis Olsen.....	Thor.....	Thor.....	Sept
Ida County.							
518	Arthur.....	Arthur Creamery	Ind.....	I. G. Arthur.....	Arthur.....	Arthur.....	Sept
519	Battle Creek.....		Ind.....	Peter Nielsen.....	Battle Creek.....	Battle Creek.....	Sept
520	Galva.....		Ind.....	Robert Jorgensen.....	Galva.....	Galva.....	Sept
521	Holstein.....		Ind.....	Papritz & Bischoff.....	Holstein.....	Holstein.....	Sept
522	Ida Grove.....		Ind.....	Hallam & Hubbard.....	Ida Grove.....	Ida Grove.....	Sept
Iowa County.							
523	Genoa Bluff.....	Genoa Bluff.....	Ind.....	Geo. R. Howard.....	Genoa Bluff.....	Genoa Bluff.....	G. C.

544	Marango	Ind	H. A. Brown	Marango	Marango	J. W. Howard	S & G. C.	Test	
545	Millersburg	Ind	McCabe Bros.	Millersburg	Millersburg	J. H. Hiddle	S & G. C.	Test	
546	North English	Ind	R. P. Chiles	North English	North English		G. O.	Test	
547	Williamsburg	Ind	J. M. Mathew	Williamsburg	Williamsburg	P. McKenker	G. O.	Test	
548	Williamsburg	Ind	J. M. Mathew	Williamsburg	Williamsburg	J. M. Mathew	G. O.	Test	
Jackson County									
549	Andrew	Ind	W. H. Gistfeld	Andrew	Maquette	A. B. Ayres	Sep'tr	Test	728
550	Baldwin No. 27	Ind		Boston, Mass			Sep'tr	Test	
551	Bellevue	Ind		Springbrook	Bellevue	Geo. Walder	S & G. O.	Test	
552	Bellevue	Book		Bellevue	Bellevue	F. H. Enfinger	G. O.	Test	
553	Ottomville	Ind		Springbrook			S & G. O.	Test	
554	Ottomville	Ind		Bellevue	Monmouth	Henry Brady	Sep'tr	Test	
555	Quilme	Ind		Bellevue	Maquette	Chas. Vahn	Sep'tr	Test	
556	Quilme	Ind		Bellevue	Bernard	Jas. Church	Sep'tr	Test	
557	Hugo	Co-op		Bellevue	Lamotte		S & G. O.	Test	305
558	Lamotte	Ind		Lamotte	Lamotte		S & G. O.	Test	
559	Lamotte	Ind		Lamotte	Lamotte	John Hoffman	S & G. O.	Test	
560	Lamotte	Ind		Lamotte	Lamotte	John Hoffman	S & G. O.	Test	
561	Miles	Co-op		Miles	Miles	Chas. Allen	Sep'tr	Test	98
562	Monmouth	Co-op		Monmouth	Monmouth	Sam. Onley	Sep'tr	Test	124
563	Otter Creek	Ind		Otter Creek	Welling	Wm. Blunt	Sep'tr	Test	25
564	Preston	Ind		Preston	Preston		Sep'tr	Test	781
565	Springville	Ind		Springville			Sep'tr	Test	
566	St. Donatus	Ind		St. Donatus			Sep'tr	Test	
567	Union Center	Ind	Jas. Newman & Co.	Lamotte			S & G. O.	Test	
Jasper County									
568	Barter	Co-op	Henry Krumpke, Jr.	Barter	Barter	R. E. Isaklin	Sep'tr	Test	745
569	Barter	Ind	I. M. Harris	Jeunp.	Barter	T. O. Sheels	Sep'tr	Test	
570	Ira	Ind	T. F. Gupill	Toledo	Ira	W. Moss	Sep'tr	Test	
571	Kellogg	Ind	M. O. Chase	Monroe	Kellogg	S. H. Payne	Sep'tr	Test	
572	Monroe	Ind	H. D. Parsons	Newton	Monroe	John Murray	Sep'tr	Test	281
573	Newton	Ind	W. R. Oldwell, Mgr.	Newton	Newton		Sep'tr	Test	
574	Reasnor	Sik Co	J. M. Engle, Sec.	Reasnor	Reasnor	F. E. Bean	Sep'tr	Test	102
575	Valeria	Co-op		Bondurant	Valeria	J. S. Wilson	Sep'tr	Test	
Jefferson County									
576	Abingdon	Ind	D. Mosher	Fairfield	Fairfield		Sep'tr	Test	
577	Fairfield	Ind	H. A. Hoopes	Fairfield	Fairfield		Sep'tr	Test	699
578	Fairfield	Sik Co	N. C. Smith	Fairfield	Fairfield		Sep'tr	Test	179
579	Four Corners	Ind	J. F. Craig, Mgr.	Four Corners	Lockridge	N. C. Smith	Sep'tr	Test	91
580	Germanville	Co-op	F. J. Klenham	Germanville	Brighton	J. H. Johnson	Sep'tr	Test	128
581	Glasgow	Ind	Edward Hartman	Glasgow	Lockridge	F. J. Klenham	Sep'tr	Test	
582	Lockridge	Ind	J. D. Mosher	Lockridge	Lockridge	Ed. Hartman	Sep'tr	Test	638
583	Packwood	Ind		Packwood	Packwood	A. W. Barum	Sep'tr	Test	928
584	Salina	Sik Co	Henry Goers	Salina	Beckwith	Henry Goers	Sep'tr	Test	115

* Skin Stations

504	Monticello, No 41	Ind...	Simpson, Mel. & Co.	Boston, Mass.	...	Sep'tr...	Test...	
505	Oxley, No 20	Ind...	Simpson, Mel. & Co.	Boston, Mass.	...	Sep'tr...	Test...	
506	Wyand, No 16	Ind...	Simpson, Mel. & Co.	Boston, Mass.	...	Sep'tr...	Test...	
507	Monticello...	Co-op	I. F. Lauder, Sec.	Monticello...	...	Sep'tr...	Test...	1028
508	Monticello...	Co-op	I. L. Archer, Sec.	Monticello...	...	Sep'tr...	Test...	1029
509	Monticello...	Co-op	Geo. Ambush...	Monticello...	...	Sep'tr...	Test...	979
510	Oldham...	Ind...	Wright & Swanson...	Oldham...	...	Sep'tr...	Test...	635
511	Scotch Grove...	Ind...	O. M. Hanna...	Scotch Grove...	...	Sep'tr...	Test...	635
512	Wyoming...	Co-op	J. W. Rhodes...	Wyoming...	...	Sep'tr...	Test...	1015
Kearuk County 1								
513	Delta...	Ind...	I. A. Dickson...	Delta...	...	Sep'tr...	Test...	24
514	Keota...	Stk Co	E. E. Reiman...	Keota...	...	Sep'tr...	Test...	
515	What Cheer...	Stk Co	F. L. Emery...	What Cheer...	...	Sep'tr...	Test...	
Kearuk County 2								
516	Alcona...	Co-op	...	Alcona...	...	Sep'tr...	Test...	224
517	Bancroft...	Co-op	...	Bancroft...	...	Sep'tr...	Test...	682
518	Bancroft...	Co-op	...	Bancroft...	...	Sep'tr...	Test...	682
519	Buffalo Fork...	Co-op	...	Buffalo Fork...	...	Sep'tr...	Test...	597
520	Burt...	Co-op	...	Burt...	...	Sep'tr...	Test...	548
521	Burt...	Co-op	...	Burt...	...	Sep'tr...	Test...	548
522	German Valley...	Co-op	Geo. W. Newell, Sec.	German Valley...	...	Sep'tr...	Test...	1185
523	Germania...	Co-op	P. E. Johnston...	Germania...	...	Sep'tr...	Test...	1185
524	Hobart...	Co-op	...	Hobart...	...	Sep'tr...	Test...	300
525	Irrington...	Co-op	...	Irrington...	...	Sep'tr...	Test...	159
526	Ledyard...	Co-op	...	Ledyard...	...	Sep'tr...	Test...	1167
527	Lone Rock...	Co-op	...	Lone Rock...	...	Sep'tr...	Test...	14
528	Lone Creek...	Co-op	...	Lone Creek...	...	Sep'tr...	Test...	128
529	Laverne...	Co-op	...	Laverne...	...	Sep'tr...	Test...	178
530	Laverne...	Co-op	...	Laverne...	...	Sep'tr...	Test...	108
531	Laverne...	Ind...	...	Laverne...	...	Sep'tr...	Test...	1160
532	Saxon...	Co-op	...	Saxon...	...	Sep'tr...	Test...	167
533	St. Joseph...	Co-op	...	St. Joseph...	...	Sep'tr...	Test...	1317
534	Sweet City...	Co-op	...	Sweet City...	...	Sep'tr...	Test...	120
535	West Bend...	Co-op	...	West Bend...	...	Sep'tr...	Test...	102
536	Whittemore...	Stk Co	...	Whittemore...	...	Sep'tr...	Test...	1050
537	Whittemore...	Co-op	...	Whittemore...	...	Sep'tr...	Test...	98
Lee County								
538	Argyle...	Ind...	...	Argyle...	...	Sep'tr...	Test...	

* Manufacture both butter and cheese.

* Skim Stations.

CREAMERY LIST—CONTINUED.

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Louisiana County.									
655	Fredonia.....	Fredonia Creamery.....	Ind.....	Thomas Carey.....	Fredonia.....	Fredonia.....	E. W. Kelley.....	G. C.	Test.
656	Leta.....	Leta Creamery.....	Ind.....	J. M. Hildebrand.....	Leta.....	Leta.....	J. M. Hildebrand.....	G. C.	Test.
657	Wapello.....	Wapello Creamery.....	Ind.....	F. P. Bricebush.....	Wapello.....	Wapello.....	F. P. Bricebush.....	G. C.	Test.
Lucas County.									
661	Russell.....	Russell Creamery Co.....	Stock.	W. J. Marshall.....	Russell.....	Russell.....	W. J. Marshall.....	Sep'tr.	Test.. 84
Lyon County.									
663	Inwood.....	Inwood Creamery.....	Ind.....	A. Nordmark.....	Inwood.....	Inwood.....	A. Nordmark.....	Sep'tr.	Test.. 688
664	Larchwood.....	Larchwood Ory Co.....	Ind.....	W. H. Bradley.....	Larchwood.....	Larchwood.....	E. O. Wright.....	Sep'tr.	Test.. 688
665	Lester.....	Lester Creamery Co.....	Co-op	H. W. West, Sec.	Lester.....	Lester.....	L. W. Billings.....	Sep'tr.	Test.. 1877 294
666	Rock Rapids.....	Rock Rapids Creamery.....	Ind.....	Moon & Morrow.....	Rock Rapids.....	Rock Rapids.....	H. E. Morrow.....	Sep'tr.	Test.. 1877 294
Madison County.									
668	Barney.....	Troy & Honey Ory Co.....	Ind.....	Marlatt & Clark.....	Barney.....	Barney.....	J. A. De Lay.....	Sep'tr.	Test.. 1179 78
669	Macksburg.....	Cook Creamery.....	Ind.....	J. W. Way.....	Macksburg.....	Macksburg.....	J. W. Way.....	Sep'tr.	Test.. 1841
670	McBride.....	McKee Bros. (s).....	Ind.....	McKee Bros.....	McBride.....	McBride.....	— Carpenter.....	Sep'tr.	Test.
671	Pitzer.....	Pitzer Co-op Ory Co.....	Co-op	W. Epperd, Pres.....	Pitzer.....	Pitzer.....	— Carpenter.....	Sep'tr.	Test.
Madison County.									
670	New Sharon.....	New Sharon Produce Co.....	Stock.	New Sharon Pro. Co.....	New Sharon.....	New Sharon.....	H. Martin.....	G. C.	Test.. 1024 34
Martin County.									
671	Bussey.....	Bussey Creamery.....	Ind.....	W. E. Caldwell & Co.....	Bussey.....	Bussey.....	W. E. Caldwell.....	Sep'tr.	Test.. 1024 34
672	Knoxville.....	Knoxville Creamery.....	Ind.....	J. J. Bousquet.....	Pella.....	Pella.....	W. H. Lifer.....	G. C.	Test.
673	Pella.....	Garden City Creamery.....	Ind.....	J. J. Bousquet.....	Pella.....	Pella.....	T. Smorenburg.....	G. C.	Test.
Marshall County.									
674	Glenora.....	Minerva Valley Ory Co.....	Co-op.	—	Glenora.....	Glenora.....	Henry Nolte.....	G. C.	Test.. 1025 170
675	Glen.....	Marshall Ory Co. (s).....	Ind.....	—	Glen.....	Glen.....	—	Sep'tr.	Test.. 1025 170
676	Green Mount.....	Green Mount Ory An.....	Co-op.	—	Green Mount.....	Green Mount.....	O. S. Woods.....	Sep'tr.	Test.. 1025 170
677	Haverhill.....	Marshall Ory Co. (s).....	Ind.....	—	Haverhill.....	Haverhill.....	—	Sep'tr.	Test.. 1025 170
678	La Mollie.....	Linn Brook Dairy Co.....	Ind.....	—	La Mollie.....	La Mollie.....	—	Sep'tr.	Test.. 1025 170
679	Liscomb.....	Marshall Ory Co. (s).....	Ind.....	—	Liscomb.....	Liscomb.....	—	Sep'tr.	Test.. 1025 170
680	Marshalltown.....	Marshall Creamery Co.....	Ind.....	—	Marshalltown.....	Marshalltown.....	—	Sep'tr.	Test.. 1025 170
681	Melbourne.....	Marshall Ory Co. (s).....	Ind.....	—	Melbourne.....	Melbourne.....	—	Sep'tr.	Test.. 1025 170
682	Melbourne.....	Farmers Co-op Ory An.....	Co-op.	—	Melbourne.....	Melbourne.....	—	Sep'tr.	Test.. 1025 170
683	Rhodes.....	Marshall Ory Co. (s).....	Ind.....	—	Rhodes.....	Rhodes.....	—	Sep'tr.	Test.. 1025 170
684	State Center.....	State Center Farmery.....	Co-op.	E. G. Swift, Sec.....	State Center.....	State Center.....	—	G. C.	Test.. 1025 170

* Manufacture both butter and cheese.

* Skim Stations.

CREAMERY LIST—CONTINUED.

Office record number	Emerson	Elmer	Golden Hill Dairy	Ind	W. M. Tolander	Emerson	Emerson St'n	W. M. Tolander	Method of receiving milk—by the hundred	No. of D. O. test bottles	No. of D. O. pi-pette
685	Emerson	Elmer	Golden Hill Dairy	Ind	W. M. Tolander	Emerson	Emerson St'n	W. M. Tolander	Test.		
686	Glenwood	Golden Hill Dairy	Ind	W. W. Mickelwait, P	Glenwood	Malvern	Hillsdale	D. T. Phelps	Test.		
687	Malvern	Malvern Creamery	Ind	T. J. Beata, Prop	Malvern	Malvern	Malvern	T. J. Beata	G. C.		
688	Silver City	Malvern Creamery (s)	Ind	T. J. Beata, Prop	Malvern	Malvern	Malvern	T. J. Beata	G. C.		
Mitchell County.											
689	Bailey	Lawa Spring	Co-op	T. J. Wheeler, Pres.	Bailey	Bailey	Bailey	R. Hauge	Test.	1000	
690	Little Cedar		Co-op		Little Cedar	Little Cedar	Little Cedar	O. E. French	G. C.		
691	Merona		Co-op		Merona	Merona	Merona	L. McLaren	G. C.	700	
692	Newhaven		Co-op		Newhaven	Newhaven	Newhaven	D. T. Thomas	G. C.		
693	Orchard		Co-op		Orchard	Orchard	Orchard	M. V. Brothers	H & G. O.		
694	Osage		Co-op		Osage	Osage	Osage	D. Mc Neal	G. C.		
695	Riceville		Co-op		Riceville	Riceville	Riceville	George Miller	G. C.		
696	St. Ansgar		Co-op		St. Ansgar	St. Ansgar	St. Ansgar	A. Anderson	G. C.		
697	Toeterville		Co-op		Toeterville	Toeterville	Toeterville	S. H. Nelson	Sept'r		
Monona County.											
698	Whiting	Whiting Creamery Co.	Co op	Chas. Cassidy, Sec.	Whiting	Whiting	Whiting	Niles Darfelle'n	Sept'r	1200	100
Monroe County.											
699	Albia	Albia Creamery	d	S. D. Thompson	Albia	Albia	Albia	B. B. Wallace	Sept'r		
Montgomery County.											
700	Elliott	Elgin Creamery Co.	Ind	O. Sanda, Pres.	Chicago, Ill	Chicago, Ill	Elliott		Sept'r	119	
701	Stanton	Elgin Creamery Co. (s)	Ind	O. Sanda, Pres.	Chicago, Ill	Chicago, Ill	Stanton		Sept'r		
702	Wales	Elgin Creamery Co. (s)	Ind	O. Sanda, Pres.	Chicago, Ill	Chicago, Ill	Wales		Sept'r		

CREAMERY LIST—CONTINUED.

Office record number	LOCATED AT OR NEAR.	NAME OF CREAMERY.	Owned by an individual, co-operative or stock company.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF BUTTER-MAKER	Separator, bath or both.	Method of receiving milk—by the test or by the hundred.	No of U. C. tests	No of D. O. pl. tests.
	<i>Palo Alto County—Continued.</i>										
726	West Bend.....	West Bend Co-op.....	Co-op.	L. E. Temple.....	West Bend.....	West Bend.....	T. A. Clark.....	Sep'tr.	Test.....	265	
727	West Bend.....	Eureka Creamery Co.....	Co-op.	Henry Dunn.....	West Bend.....	West Bend.....	H. G. Carpenter.....	Sep'tr.	Test.....	1266	124
	<i>Plymouth County.</i>										
728	Akron.....		Co-op.	C. F. Horton, Sec. J. F. Gorman.....	Akron.....	Akron.....	Wm. Anderson.....	Sep'tr.	Test.....	729	209
729	Ellendale.....		Co-op.	W. G. Pearson.....	Ellendale.....	Merrill.....	John Erbridge.....	Sep'tr.	Test.....	1253	
730	Hinton.....		Co-op.	E. A. Kunkel.....	Hinton.....	Hinton.....	O. B. Horrocks.....	Sep'tr.	Test.....	733	
731	Le Mars.....		Co-op.	D. M. O'Brien, Sec. Dan O'Brien.....	Le Mars.....	Le Mars.....	A. F. Fosse.....	Sep'tr.	Test.....	655	32
732	Merrill.....		Co-op.	E. F. Hickey, Sec. E. F. Hickey.....	Merrill.....	Merrill.....	O. H. Hansen.....	Sep'tr.	Test.....	1164	
733	Neptuna.....		Co-op.	E. F. Hickey, Sec. E. F. Hickey.....	Neptuna.....	Le Mars.....	A. F. Fosse.....	Sep'tr.	Test.....	1169	46
734	O'Leary.....		Co-op.	E. F. Hickey, Sec. E. F. Hickey.....	O'Leary.....	O'Leary.....	H. Hansen.....	Sep'tr.	Test.....	1268	133
735	Oreana.....		Co-op.	E. F. Hickey, Sec. E. F. Hickey.....	Oreana.....	Oreana.....	J. Kennedy.....	Sep'tr.	Test.....	1268	133
736	Ransom.....		Co-op.	E. F. Hickey, Sec. E. F. Hickey.....	Ransom.....	Ransom.....	CH Vanderham.....	Sep'tr.	Test.....	1268	133
737	Struble.....	Struble Creamery.....	Co-op.	E. L. Durband, Sec. Ed. Durband.....	Struble.....	Struble.....	CH Vanderham.....	Sep'tr.	Test.....	1268	133
	<i>Pocahontas County.</i>										
738	Fonda.....	Lilly Creamery Co.....	Ind.	J. D. Fitzgerald.....	Lilly.....	Fonda.....	B. M. Lamb.....	Sep'tr.	Test.....	1127	
739	Fonda.....		Ind.	E. F. Beavick.....	Fonda.....	Fonda.....	Vargason & E.....	Sep'tr.	Test.....	1127	248
740	Glimore City.....		Ind.	W. & J. G. Hinn.....	Glimore City.....	Glimore City.....	F. W. Johnson.....	Sep'tr.	Test.....	1190	109
741	Havlock.....		Ind.	W. & J. G. Hinn.....	Laurens.....	Laurens.....	Wm. Breibolz.....	Sep'tr.	Test.....	1181	234
742	Laurens.....		Ind.	John Carroll.....	Plover.....	Plover.....	B. Fisher.....	Sep'tr.	Test.....	789	
743	Plover.....		Ind.	E. C. M. Breibolz.....	Pomeroy.....	Pomeroy.....	E. D. Rogers.....	Sep'tr.	Test.....	1158	23
744	Pomeroy.....		Ind.	E. C. M. Breibolz.....	Pomeroy.....	Pomeroy.....		Sep'tr.	Test.....		
745	Pomeroy.....		Ind.	E. C. M. Breibolz.....	Pomeroy.....	Pomeroy.....		Sep'tr.	Test.....		
746	Pomeroy.....		Ind.	E. C. M. Breibolz.....	Pomeroy.....	Pomeroy.....		Sep'tr.	Test.....		
747	Boile.....		Ind.	W. H. Rogers.....	Boile.....	Boile.....		Sep'tr.	Test.....		
	<i>Polk County.</i>										
748	Bondurant.....	Bondurant Creamery.....	Ind.	E. L. McAdam.....	Chicago, Ill.....	Bondurant.....	Roberts Dowling.....	Sep'tr.	Test.....		

769	Campbell.....	Stk Co	W. J. Stewart.....	Grimes	Des Moines	Des Moines	Test	
770	Crocker Center	Ind	MacRae Bros.....	Des Moines	Des Moines	Des Moines	Test	
771	Des Moines	Stk Co	W. J. Stewart.....	Grimes	Grimes	Grimes	Test	104
772	Grimes	Ind	E. J. McLean	Chicago, Ill.	Marvell	W. P. Nelson	Test	104
773	Marvell	Ind	William Richard	Mitchellville	Mitchellville	Geo. E. Heller	Test	104
774	Mitchellville	Co-op	MacRae Bros.....	Des Moines	Des Moines		Test	104
775	Runnells.....	Ind					Test	104
<i>Potomac County</i>								
776	Avoca.....	Ind	R. Frost, Prop.	Avoca	Avoca	John Dehler	Test	361
777	Hancock	Ind	H. G. Hendry	Hancock	Hancock	W. P. Geyer	Test	361
778	Madison	Stk Co	C. H. McCreedy	Madison	Madison	W. P. Jorgensen	Test	361
779	Maynor	Co-op	Samuel Blum, Sec.	Living Spring	Living Spring	P. O. Winchell	Test	361
780	Reynolds	Stk Co	A. Danrow, Sec.	Living Spring	Living Spring		Test	361
<i>Potomac County</i>								
771	Brooklyn	Ind	J. W. Heigh, Mgr.	Brooklyn	Brooklyn	J. W. Heigh	Test	197
772	Deep River	Ind	Hatter & Baird	Deep River	Deep River	Edw. Adkins	Test	197
773	Grinnell	Ind	J. W. Fowler	Grinnell	Grinnell		Test	197
774	Grinnell	Ind	Marshall Ory Co.	Marshalltown	Marshalltown		Test	197
775	Guernsey	Ind	A. L. Minehart, Sec.	Guernsey	Guernsey	A. L. Minehart	Test	197
776	Hartwick	Ind	John Newman Co.	Elgin, Ill.	Hartwick		Test	197
<i>Ringgold County</i>								
777	Knovilton	Ind	O. Sands, Pres.	Chicago, Ill.	Chicago, Ill.		Test	
778	Redding	Ind	D. M. Rich	Redding	Redding	D. M. Rich	Test	
779	Shannon City	Co-op	Fred C. Bliss, Sec.	Polen	Shannon City	J. C. Oomsstock	Test	
<i>Sas County</i>								
780	Auburn	Ind	Am's	Auburn	Auburn	J. J. Pittsman	Test	131
781	Cornarvon	Ind	B. J. McCreedy	Cornarvon	Cornarvon	Seaman & Hoon	Test	131
782	Early	Co-op	Sec.	Early	Early		Test	131
783	Early	Ind		Lake View	Lake View	J. W. W. W.	Test	131
784	Early	Ind		Early	Early		Test	131
785	Kiron	Ind		Kiron	Kiron		Test	131
786	Lake View	Ind		Lake View	Lake View		Test	131
787	Odebolt	Stk Co	Sec.	Odebolt	Odebolt		Test	131
788	Sac City	Ind		Sac City	Sac City		Test	131
789	Sac City	Ind		Pettis	Sac City		Test	131
790	Schaller	Ind		Schaller	Schaller		Test	131
791	Wall Lake	Ind		Wall Lake	Wall Lake		Test	131
792	Wall Lake	Ind		Wall Lake	Wall Lake		Test	131

* Skim Stations. * Manufacture both butter and cheese.

CREAMERY LIST—CONTINUED.

Office record number.	LOCATED AT OR NEAR.	NAME OF CREAMERY.	Owned by an individual, co-op or stock company.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS FOR SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF BUTTER-MAKER.	Separator, both or both.	Method of receiving milk or by the hundred.	No. of D. O. test bottle.	No. of D. O. p. bottle.
	Scott County.										
763	Amity		Ind ..	William Koberg	Amity	Davenport	Wm Koberg	Sep'r ..	Test ..	1009	125
764	Donahue		Ind ..	Frank Kopp	Donahue	Donahue	P. H. Kuever	Sep'r ..	Test ..		
765	Long Grove ..		Ind ..	George W. Urdla	Long Grove	Long Grove	J. Blair	G. O. ..	Inch ..		
	Shelby County										
766	Earling		Ind ..	Frank Thelle, Mgr. ..	Earling	Earling	Geo. Kohles	Sep'r ..	Hd. ..	1281	289
767	Elk Horn		Co-op ..	Christ Johnson, Mgr. ..	Elk Horn	Brayton	Christ Johnson ..	Sep'r ..	Test ..		
768	Irwin		Ind ..	Sweger & Pruter	Aspinwall	Brayton	Christ Johnson ..	Sep'r ..	Test ..	751	
769	Jacksonville ..		Co-op ..	R. Rasmussen, Sec. ..	Jacksonville ..	Kirkman	A. P. Vithen	Sep'r ..	Test ..		
770	Kirkman		Co-op ..	H. Dahl of Sec	Kirkman	Portsmouth ..	A. P. Vithen	Sep'r ..	Test ..		
771	Portsmouth ..		Ind ..	M. A. Sorenson	Portsmouth ..	Portsmouth ..	M. O. Madsen	Sep'r ..	Test ..		
772	Walnut	Prairie Rose	Co-op ..	J. D. Lorentzen, Sec ..	Harlan	Walnut	M. O. Madsen	Sep'r ..	Test ..		
773	Westphalia ..	Earling Cr'y Co. (s) ..	Ind ..	Frank Thelle, Mgr. ..	Earling	Walnut	M. O. Madsen	Sep'r ..	Hd. ..		
	Sioux County										
774	Alton	Alton Creamery	Ind ..	Mueller Bros	Alton	Alton	M. E. Mueller	Sep'r ..	Test ..	1048	72
775	Granville		Stk Co ..		Granville	Granville	J. B. Karbr	Sep'r ..	Hd. ..		
776	Hawarden		Co-op ..		Hawarden	Hawarden	G. A. Crowther ..	Sep'r ..	Test ..	129	
777	Hesperia		Co-op ..		Hesperia	Hesperia	C. L. Taylor	Sep'r ..	Test ..		
778	Hull		Ind ..		Hull	Hull	Rud Stensvad	Sep'r ..	Hd. ..	254	
779	Rock Valley ..		Ind ..		Rock Valley ..	Rock Valley ..	O. A. Stensvad	Sep'r ..	Hd. ..	767	
780	Sioux Center ..		Stk Co ..		Sioux Center ..	Sioux Center ..	A. D. Roseboom ..	Sep'r ..	Hd. ..	749	
781	Sioux Center ..	Stensvad Bros. Cr'y ..	Ind ..	John Stensvad	Sioux Center ..	Sioux Center ..	John Stensvad	Sep'r ..	Hd. ..	997	
	Story County.										
782	Ames	La. Agr'l College Cr'y ..	State ..	Geo. L. McKay, Mgr. ..	Ames	Ames	Geo. L. McKay	Sep'r ..	Test ..	804	
783	Ames	Millford Farmers' Cr'y ..	Co-op ..	W. J. Gilmore, Sec. ..	Ames	Ames	F. Born	Sep'r ..	Test ..	806	
784	Cambridge	Cambridge Farmers' Co-op Creamery ..	Co-op ..	Oliver Hill, Sec	Cambridge	Cambridge	J. E. Moody	Sep'r ..	Test ..	1019	
785	Collins	Farmers' Co-op Cr'y ..	Co-op ..	A. G. Armstrong	Collins	Collins	A. G. Armstrong ..	Sep'r ..	Test ..	646	84

816	Colo.	.....	Ind	.....	Boardman Bros.	Nevada	.....	Colo.	.....	L. M. Kelley	Sep'tr	Test	414	27
817	Gilbert Station	.....	Ind	.....	.....	.....	.....	Gilbert Sta	.....	Peter Jensen	Sep'tr	Test	1185	
818	Huxley	.....	Co-op	.....	.....	.....	.....	Huxley	.....	J. F. Burrows	Sep'tr	Test	238	
819	Maxwell	.....	Ind	.....	.....	.....	.....	.....	.....	.....	Sep'tr	Test	240	
820	McCallahan	.....	Ind	.....	.....	.....	.....	.....	.....	.....	Sep'tr	Test	178	
821	Nevada	.....	Ind	.....	.....	.....	.....	.....	.....	T. B. Russell	Sep'tr	Test		
822	Poland	.....	Six Co	.....	.....	.....	.....	.....	.....	.....	Sep'tr	Test		
823	Poland	.....	Co-op	.....	E. J. Evanson, Sec	Poland	.....	Poland	.....	B. Nelson	Sep'tr	Test		
824	Slater	.....	Co-op	.....	Ois Langland, Sec	Slater	.....	Slater	.....	John Freeland	Sep'tr	Test	728	79
825	Story City	.....	Co-op	.....	J. C. Bonnhart, Sec	Story City	.....	Story City	.....	Geo. Wick	Sep'tr	Test		
826	Zealand	.....	Co-op	.....	.....	Zealand	.....	Zealand	.....	J. J. Ross	Sep'tr	Test		
Tama County														
827	Berlin	.....	Ind	.....	Marshall Ory Co.	Marshalltown	.....	Chelsea	.....	Robert Allee	Sep'tr	Test	1128	26
828	Chelsea	.....	Ind	.....	.....	Chelsea	.....	Chelsea	.....	.....	G. O.	Test		
829	Dinsdale	.....	Co-op	.....	.....	Dinsdale	.....	Dinsdale	.....	T. M. Putnam	Sep'tr	Test	1297	229
830	Dysart	.....	Ind	.....	.....	Dysart	.....	Dysart	.....	F. J. Reeder	Sep'tr	Test	28	28
831	Dysart	.....	Ind	.....	.....	Dysart	.....	Dysart	.....	Fred E. Packer	Sep'tr	Test	1191	112
832	Elberon	.....	Ind	.....	.....	Elberon	.....	Elberon	.....	.....	Sep'tr	Test		
833	Gladbrook	.....	Ind	.....	.....	Gladbrook	.....	Gladbrook	.....	.....	Sep'tr	Test		
834	Montour	.....	Ind	.....	.....	Montour	.....	Montour	.....	.....	Sep'tr	Test		
835	Montour	.....	Ind	.....	.....	Montour	.....	Montour	.....	.....	Sep'tr	Test		
836	Toledo	.....	Six Co	.....	.....	Toledo	.....	Toledo	.....	J. G. Goldey	Sep'tr	Test		
837	Tracer	.....	Ind	.....	J. B. O'Connor	Tracer	.....	Tracer	.....	F. O'Connor	Sep'tr	Test		
Taylor County														
838	Bedford	.....	Ind	.....	W. A. Geithman	Bedford	.....	Bedford	.....	W. A. Geithman	Sep'tr	Test	609	227
839	Clearfield	.....	Six Co	.....	Joseph Doubet	Clearfield	.....	Clearfield	.....	Geo. W. McKail	Sep'tr	Test		
840	Conway	.....	Ind	.....	Lake Bros	Conway	.....	Conway	.....	F. W. Ketch	Sep'tr	Test		
841	Guss	.....	Co-op	.....	H. B. Moxie, Sec	Guss	.....	Guss	.....	W. A. Leibhardt	Sep'tr	Test	1298	
842	Guss	.....	Ind	.....	E. Schoonover	Guss	.....	Guss	.....	E. Schoonover	Sep'tr	Test	1128	
843	Lenox	.....	Ind	.....	O. Sands, Pres	Chicago, Ill.	.....	.....	.....	.....	Sep'tr	Test		
Union County														
844	Afton	.....	Ind	.....	O. Sands, Pres	Chicago	.....	Afton	.....	J. W. Kelly	Sep'tr	Test	771	
845	Arlispe	.....	Co op	.....	Samuel Clough, Jr.	Arlispe	.....	Arlispe	.....	H. L. Case	Sep'tr	Test	728	
846	Oreston	.....	Ind	.....	O. Sands, Pres	Chicago	.....	Oreston	.....	E. G. McCall	Sep'tr	Test		
847	Cromwell	.....	Ind	.....	O. Sands, Pres	Chicago	.....	.....	.....	.....	Sep'tr	Test		
848	Dodge	.....	Ind	.....	O. Sands, Pres	Chicago	.....	.....	.....	.....	Sep'tr	Test		
849	Kent	.....	Ind	.....	Chas E. Chawgo	Prescott	.....	.....	.....	.....	Sep'tr	Test		
850	Lincoln	.....	Ind	.....	O. Sands, Pres	Chicago	.....	.....	.....	.....	Sep'tr	Test		
851	Lorimer	.....	Ind	.....	O. Sands, Pres	Chicago	.....	Lorimer	.....	Geo. Beckman	Sep'tr	Test	937	
852	Pleasant	.....	Ind	.....	O. Sands, Pres	Chicago	.....	.....	.....	.....	Sep'tr	Test		
853	Talmage	.....	Six Co	.....	J. W. Babee, Sec	Talmage	.....	Talmage	.....	M. E. Thompson	Sep'tr	Test	253	121
854	Talmage, No. 1	.....	Six Co	.....	J. W. Babee, Sec	Talmage	.....	.....	.....	.....	Sep'tr	Test		

* Manufacture both butter and cheese.

* Skim Stations.

CREAMERY LIST—CONTINUED.

Office record number.	LOCATED AT OR NEAR.	NAME OF CREAMERY.	Operated by an individual, co-operative, or stock company.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF BUTTER-MAKER	Separator, bathed cream, or both.	Method of receiving milk — by the test or by the hundred.	No. of D. O. test bottle.	No. of D. O. pl-pette.
	<i>Union County</i>	<i>—Continued.</i>									
855	Talmage, No. 2	Talmage Cr'y Co. (s)....	Stk Co	J. W. Bebee, Sec....	Talmage.....	.....	.....	Sep'tr ..	Test.		
856	Talmage, No. 3	Talmage Cr'y Co. (s)....	Stk Co	J. W. Bebee, Sec....	Talmage.....	.....	.....	Sep'tr ..	Test.		
857	Thayer.....	Elgin Creamery (s).....	Ind ...	O. Sands, Pres.....	Chicago.....	.....	.....	Sep'tr ..	Test.		
	<i>Van Buren County.</i>										
858	Cantril	Cantril B. & C. Co.....	Stk Co	O. P. DeFord	Cantril.....	Cantril..	Wm. Cook..	S. & G. O.	Test.		
859	Farmington...	Wells-Sherman Co....	Ind ...	Wells-Sherman Co..	Farmington ..	Farmington..	Tom. Mearick.	Sep'tr ..	Test.		
860	Milton....	Milton Creamery..	Ind ...	Woodward & Cooley	Milton..	Milton.....	V. T. Cooley...	G. O.....	Test.		
861	Stockport	Fairfield Creamery (s)..	Ind ...	D. Mosher	Fairfield.....	.....	.....	Sep'tr ..	Test.		
	<i>Wasello County.</i>										
862	Agency.....	Agency B. & O. Co.....	Ind ...	O. E. Mortison	Agency	Agency	O E. Mortison.	Sep'tr ..	Test.	1184	95
863	Blakesburg...	Blakesburg Creamery..	Ind ...	Nelson & Fritz.	Blakesburg....	Blakesburg...	A. E. Nelson...	Sep'tr ..	Test..		
864	Dudley.....	Dudley Creamery.....	Ind ..	Fred Buxton.	.....	.....	.....	.....	.....
865	Ottumwa.	South Ottumwa.....	Ind ...	E. O. McKimmy	S. Ottumwa....	Ottumwa....	J G. Myers....	Sep'tr ..	Test..	683	235
	<i>Warren County.</i>										
866	Caloma.....	Warren County Cr'y (s).	Ind ...	E. Haldeman.....	Indianola.....	.....	.....	Sep'tr ..	Test.		
867	Indianola.....	Warren County Cr'y ..	Ind ...	E. Haldeman.....	Indianola	Indianola....	Geo. Babbitt..	Sep'tr ..	Test.		
868	Milo	Warren County Cr'y (s).	Ind ...	E. Haldeman.....	Indianola.....	.....	.....	Sep'tr ..	Test.		
869	Norwalk	MacRae Bros (s).....	Ind ...	MacRae Bros	Des Moines ..	.....	.....	Sep'tr ..	Test.		
870	Prole.....	Prole Creamery.	Ind ...	E. H. Perkins	Prole.....	Prole.....	E. H. Perkins..	Sep'tr ..	Test.		
	<i>Washington County.</i>										
871	Brighton.....	Brighton Creamery. ..	Stk Co	H. J. Keintz, Sec....	Brighton	Brighton	W. G. Brooke..	G. O.	Test..	1186	
872	Kalona	Kalona Creamery.	Ind ...	W. G. Brooke & Son.	Kalona	Kalona..	E. J. Eicher...	Sep'tr ..	Test..	998	125
873	Noble.....	Oak Ridge Creamery...	Ind ...	E. J. Eicher, Mgr....	Noble	Wayland	Wm. Miles....	G. O.....	Test..		
874	Riverside	Riverside Creamery....	Ind ...	E. Nicola & Co.....	Riverside.....	Riverside..	G. G. Reister...	Sep'tr ..	Test..	876	
875	Washington....	Washington.....	Ind ...	Hise Co.	Washington....	Washington..	.....	Sep'tr ..	Test..		

876	Wellman.....	Daytonville Creamery..	Ind...	O. O. Nicholas..	Wellman.....	Wellman.....	Sep'tr..	Test..	883
	Wayne County								
877	Allerton.....	Allerton Creamery....	Ind..	L. N. Haldeman	Allerton.....	Allerton.....	Sep'tr..	T. & H.	883 131
878	Bethlehem.....	Bethlehem Creamery....	Ind..	T. G. Hyde.....	Burnside.....	Burnside.....	Sep'tr..	Test.	
879	Cambria.....	Wayne County Cr'y (a)...	Ind..	T. G. Hyde.....	Dayton.....	Dayton.....	Sep'tr..	Test.	
880	Corydon.....	Wayne County Cr'y (a)...	Ind..	T. G. Hyde.....	Duncombe.....	Duncombe.....	Sep'tr..	Test.	1197 119
881	Humeston.....	Wayne County Cr'y (a)...	Ind..	T. G. Hyde.....	Ft. Dodge.....	Ft. Dodge.....	Sep'tr..	Test.	
882	Humeston.....	Wayne County Cr'y (a)...	Ind..	T. G. Hyde.....	Gowrie.....	Gowrie.....	Sep'tr..	Test.	
883	Lewistown.....	Wayne County Cr'y (a)...	Ind..	T. G. Hyde.....	Moorland.....	Moorland.....	Sep'tr..	Test.	
884	Seymour.....	Wayne County Cr'y (a)...	Ind..	E. S. Parker.....	Seymour.....	Seymour.....	Sep'tr..	Test.	1177 11
	Webster County								
885	Badger.....		Ind..	G. W. Gillman.....	Badger.....	Badger.....	Sep'tr..	Test.	238
886	Burnside.....		Co-op.		Burnside.....	Burnside.....	Sep'tr..	Test.	
887	Clare.....		Ind..		Clare.....	Clare.....	Sep'tr..	Test.	
888	Dayton.....		Ind..		Dayton.....	Dayton.....	Sep'tr..	Test.	218
889	Duncombe.....		Ind..		Duncombe.....	Duncombe.....	Sep'tr..	Test.	
890	Ft. Dodge.....		Ind..		Ft. Dodge.....	Ft. Dodge.....	Sep'tr..	Test.	
891	Gowrie.....		Ind..		Gowrie.....	Gowrie.....	Sep'tr..	Test.	
892	Moorland.....		Ind..		Moorland.....	Moorland.....	Sep'tr..	Test.	118
893	Vincent.....		Ind..	O. J. Page.....	Vincent.....	Vincent.....	Sep'tr..	Test.	
	Winnebago Co.								
894	Buffalo Center		Co-op.	E. E. Overbaugh, Sec.	Buffalo Center	Buffalo Center	Sep'tr..	Test.	
895	Dahl's Church.		Co-op.	Ole T. Groe, Mgr.	Lake Mills.....	Lake Mills.....	Sep'tr..	Test.	
896	Forest City...		Co-op.	Peter Isaacson, Sec.	Forest City...	Forest City...	Sep'tr..	Test.	
897	Hollandale.....		Co-op.	J. S. Higinbotham, S.	Thompson.....	Thompson.....	Sep'tr..	Test.	239
898	Lake Mills.....		Co-op.		Lake Mills.....	Lake Mills.....	Sep'tr..	Test.	728
899	Lake Mills.....		Co-op.		Lake Mills.....	Lake Mills.....	Sep'tr..	Test.	
900	Lake Mills.....		Co-op.		Lake Mills.....	Lake Mills.....	Sep'tr..	Test.	
901	Leland.....		Co-op.	John J. Lande.....	Leland.....	Leland.....	Sep'tr..	Test.	
902	Linden.....		Co-op.		Linden.....	Linden.....	Sep'tr..	Test.	
903	Mt. Valley.....		Co-op.	J. S. Higinbotham, S.	Thompson.....	Thompson.....	Sep'tr..	Test.	
904	Mt. Valley.....		Co-op.	A. G. Paulsen, Mar.	Fertile.....	Fertile.....	Sep'tr..	Test.	
905	Moosh.....		Co-op.	Peter Isaacson, Sec.	Forest City...	Forest City...	Sep'tr..	Test.	
906	Norman.....		Co-op.	Axel Arneson, Mgr.	Norman.....	Norman.....	Sep'tr..	Test.	
907	Thompson.....		Co-op.	Axel Arneson, Mgr.	Norman.....	Norman.....	Sep'tr..	Test.	1188 24
908	Thompson.....		Co-op.	J. S. Higinbotham...	Thompson.....	Thompson.....	Sep'tr..	Test.	1176 74
				David Skutic.....	Thompson.....	Thompson.....	Sep'tr..	Test.	1181 84

* Skim Stations.

CREAMERY LIST—CONTINUED.

Office record number.	LOCATED AT OR NEAR.	NAME OF CREAMERY.	Owned by an individual or partnership, or stock company.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	F. O. ADDRESS FOR PROPRIETOR, SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF BUTTER-MAKER.	Separator, bath, or both.	Method of testing milk—by the test or by the hundred.	No. of D. O. test bottles.	No. of D. O. bottles.
Winnebago County.											
906	Burr Oak..	Do..	Co-op.	C. A. Reed, Mgr.	Burr Oak.....	Decorah.....	C. A. Reed.....	G. O.	Test..	684	
910	Conover....	Co-op.	Ind.	C. E. Wood.....	Conover.....	Conover.....	Ben French.....	Sep'tr..	Test..		684
911	Castalia.....	Co-op.	Co-op.	H. L. Meyer, Sec.	Castalia.....	Castalia.....	Wm. Albright.....	S & G. O.	Test..	1322	103
912	Festina.....	Co..	Ind.	Elkader.....	Festina.....	Elkader.....	R. J. White.....	S & G. O.	Test..		
913	Highlandville..	Co..	Ind.	Hepler.....	Hepler.....	Mable.....	E. T. Helsey.....	G. O.	Test..		
914	Highlandville..	Co..	Ind.	Hepler.....	Hepler.....	Mable.....	P. J. Bidue.....	G. O.	Test..		
915	Jackson Jct....	Co-op.	Stk Co	Waucoma.....	Highlandville..	Waucoma.....	R. M. Barbour.....	S & G. O.	Test..		
916	Jackson Jct....	Co-op.	Stk Co	Waucoma.....	Highlandville..	Waucoma.....	R. M. Barbour.....	S & G. O.	Test..		
917	Jackson Jct....	Co-op.	Stk Co	Waucoma.....	Highlandville..	Waucoma.....	R. M. Barbour.....	S & G. O.	Test..		
918	Nordness ..	Co-op.	Stk Co	Nordness ..	Nordness ..	Nordness ..	G. H. Thune.....	G. O.	Test..		
919	Nordness ..	Co-op.	Stk Co	Nordness ..	Nordness ..	Nordness ..	G. H. Thune.....	G. O.	Test..		
920	Nordness ..	Co-op.	Stk Co	Nordness ..	Nordness ..	Nordness ..	G. H. Thune.....	G. O.	Test..		
921	Ossian ..	Co-op.	Ind.	Decora.....	Ossian ..	Ossian ..	A. Bongley.....	G. O.	Test..	150	
922	Ossian ..	Co-op.	Stk Co	Decora.....	Ossian ..	Ossian ..	A. Bongley.....	G. O.	Test..		
923	Ossian ..	Co-op.	Stk Co	Decora.....	Ossian ..	Ossian ..	A. Bongley.....	G. O.	Test..		
924	Ridgeway ..	Co-op.	Co-op.	T. Scheldemantel, M.	Ridgeway.....	Ridgeway.....	G. A. Bakken.....	G. O.	Test..	43	
925	Ridgeway ..	Co-op.	Ind.	H. James Paley, Sec.	Ridgeway.....	Ridgeway.....	G. A. Bakken.....	G. O.	Test..		
926	Spillville.....	Spillville Cr'y Co. ...	Stk Co	L. T. Fasse.....	Ridgeway.....	Conover.....	L. T. Fasse.....	S & G. O.	Test..	115	
Woodbury County.											
927	Clumberg Hill..	Anthorn Creamery Co..	Stk Co	G. W. Fichtner, Sec.	Anthorn.....	Anthorn.....	A. B. Barnett.....	Sep'tr..	Test..	1287	109
928	Clumberg Hill..	Anthorn Creamery Co..	Ind.	DeWitt Goodrich.....	Clumberg Hill..	Luton.....	DeWitt Goodrich.....	Sep'tr..	Test..		
929	Danbury.....	Anthorn Creamery Co..	Ind.	John Wilson.....	Danbury.....	Danbury.....	John Wilson.....	Sep'tr..	Test..	BA	BA
930	Danbury.....	Anthorn Creamery Co..	Co-op.	M. M. Cord.....	Danbury.....	Danbury.....	John Wilson.....	Sep'tr..	Test..		
931	Kingsley.....	Anthorn Creamery Co..	Co-op.	J. W. Landy, Sec.	Pierson.....	Kingsley.....	.....	Sep'tr..	Test..		
932	Morille.....	Anthorn Creamery Co..	Co-op.	N. H. Rawson.....	Morille.....	Morille.....	.....	Sep'tr..	Test..		
933	Oto.....	Anthorn Creamery Co..	Ind.	Welch & Smith.....	Oto.....	Leeds.....	.....	Sep'tr..	Test..		
934	Sioux City.....	Anthorn Creamery Co..	Ind.	F. J. Glenn.....	Sioux City.....	Sioux City.....	E. C. Yarn.....	Sep'tr..	Test..		
935	Smithland.....	Anthorn Creamery Co..	Ind.	N. E. Hathaway.....	Smithland.....	Smithland.....	B. Beck.....	Sep'tr..	Test..		

North County.									
935	Bristol	Co-op.	Axel Arneson, Mgr.	Norman	Manly	J. A. Johnson	Sep'tr. ..	Test.	1176
936	Fertile	Co-op.	A. G. Paulsen, Mgr.	Fertile	Grafton	T. H. Eckstein	Sep'tr. ..	Test.	1176
937	Grafton	Ind.	M. Buchrer	Grafton	Kensett	G.	Sep'tr. ..	Test.	1176
938	Kensett	Co-op.	E. E. Iboen	Kensett	Manly .....	.. ..	G.	Test.	242
939	Manly	Co-op.	D. E. McKercher, Sec.	Manly	Northwood .....	.. ..	Sep'tr. ..	Test.	758
940	Northwood	Co-op.	J. B. Thompson	Northwood	Northwood .....	.. ..	Sep'tr. ..	Test.	804
941	Northwood	Co-op.	Ole N. Grefshelm	Silver Lake	Northwood .....	.. ..	Sep'tr. ..	Test.	804
942	Northwood	Co-op.	A. W. Gulladay, Sec.	Northwood	Northwood .....	.. ..	Sep'tr. ..	Test.	804
943	Northwood	Co-op.	O. G. Anderson, Sec.	Tenold	Northwood .....	.. ..	Sep'tr. ..	Test.	804
Tenold Gr'y Ass'n.									
West County.									
944	Belmond	Ind.	E. M. Lamos	Belmond	Belmond .....	.. ..	Sep'tr. ..	Test.	1294
945	Bruce	Co-op.	J. E. Olson	Bruce	Belmond	W. L. Channer	Sep'tr. ..	Test.	1294
946	Clarion	Ind.	J. D. Denison	Clarion	Clarion	J. D. Denison	Sep'tr. ..	Test.	1294
947	Drew	Ind.	McMurty Bros.	Goldfield	Eagle Grove .....	.. ..	Sep'tr. ..	Test.	1294
948	Eagle Grove	Ind.	S. M. Middleton	Eagle Grove	Eagle Grove	Middleton	Sep'tr. ..	Test.	1294
949	Florence	Co-op.	W. E. Henely, Sec.	Florence	Florence .....	.. ..	Sep'tr. ..	Test.	1294
950	Goldfield	Ind.	B. P. Scott	Goldfield	Goldfield .....	.. ..	Sep'tr. ..	Test.	1294
951	Goldfield	Ind.	B. P. Scott	Goldfield	Goldfield	B. P. Scott	Sep'tr. ..	Test.	1294
952	Goldfield	Ind.	McMurty Bros.	Goldfield	Goldfield .....	.. ..	Sep'tr. ..	Test.	1294
953	Palsville	Co-op.	A. W. Finch, Sec.	Palsville	Palsville	John Campbell	Sep'tr. ..	Test.	1294
954	Rowan	Co-op.	J. H. Dix, Sec.	Rowan	Rowan	J. H. Gardner	Sep'tr. ..	Test.	1294
Rowan Co-op. Gr'y Co.									
Fountain B. & O. Fac.									
Fountain B. & O. Fac. (s)									
Palsville Creamery Co.									
Rowan Co-op. Gr'y Co.									
s Skim Stations.									

IOWA CHEESE FACTORY LIST.

Arranged alphabetically according to counties and towns near which factory is located, together with information pertaining to each.

Office record number.	LOCATED AT OR NEAR.	NAME OF CHEESE FACTORY.	Operated by individual, co-op or stock company.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF CHEESE-MAKER.	Method of receiving milk — by the test or by the hundred.	No. of D. C. test bottle	No. of D. C. plate
	<i>Appanoose County.</i>									
1	Iconium.....	Iconium.....	Stk Co	John Free, Pres.....	Iconium.....	Moravia.....	Jos. Elswick	Hd.		
2	Moravia.....	Star Cheese Co.....	Stk Co	Sam Johnson, Sec...	Moravia.. ..	Moravia.....	Frank Selby	Hd.		
3	Moulton	Moulton Cheese Factory.....	Ind...	A. Dickson.	Moulton.. ..	Moulton.....	A. Dickson.....	Hd.		
4	Ray	Ray Cheese Co.....	Stk Co	R. F. Main, Sec.....	Ray.....	Main Station..	Al Webster.....	Hd.		
	<i>Benton County</i>									
5	Atkins	Brookside.....	Ind...	G. M. Olmsted.....	Cedar Rapids..	Atkins.....	W. O. Stewart.....	Hd.		
6	New Hall.....	Model	Ind...	George DoebeL.....	New Hall.....	New Hall.....	J. H. Huyck.....	Hd.		
7	Rogerville	Excelsior Cheese Factory..	Ind...	R. E. Fairbanks.....	Rogerville.....	Garrison.....	R. E. Fairbanks.....	Hd...	884	
	<i>Black Hawk County.</i>									
8	Waterloo.....	North Star*	Stk Co	The Fowler Co.....	Waterloo.....	Waterloo.....	Chas. Wood.....	Test.		
9	Waterloo.....	Waterloo*	Stk Co	The Fowler Co.....	Waterloo.....	Waterloo.....	Frank Wightman..	Test.		
	<i>Buena Vista County.</i>									
10	Newell	Newell Cheese Factory Co.	Co-op.	E. W. Stetson, Sec...	Newell.....	Newell.....	.....	Test...	1207	142
	<i>Bremor County</i>									
11	Janesville.....	Janesville*	Co-op.	The Fowler Co.....	Waterloo.....	Janesville.....	A. M. Koyer.....	Test.		

<i>Corro Gordo County.</i>													
12	Burchinal..	Burchinal Cheese Factory.	Ind...	T. R. Coates, Sec ..	Burchinal.....	Burchinal.....	Louis Hoffman.....	Hd.					
13	Mason City....	Lincoln Dairy Co.....	Co-op.	R. Pethick, Sec	Mason City....	Mason City....	Will Dutton.....	T&Hd					
<i>Clarke County.</i>													
14	Weldon.....	Weldon Cheese Factory....	Ind...	Tallman & Parr.....	Weldon.....	Weldon.....	L. M. Parr.....	Hd.....	677				
<i>Crawford County.</i>													
15	Buck Grove....	Thew's Cheese Factory...	Ind...	S. M. Thew.....	Buck Grove....	Buck Grove....	Proprietor.....	Hd.					
<i>Dallas County.</i>													
16	Woodward.....	Woodward*.....	Ind...	H. P. Calonkey	Woodward.....	Woodward.....	A. B. Calonkey	Test..	204				
<i>Decatur County.</i>													
17	Bracewell..	Snow's Cheese Factory.....	Ind...	A. A. Snow.....	Bracewell	Leon	A. A. Snow.....	Hd.					
<i>Delaware County</i>													
18	Manchester....	Farmers' Cheese Mfg. Co....	Co-op.	S. J. Edmunds.....	Manchester	Manchester	Harry Willard.....	Hd.					
<i>Floyd County</i>													
19	Charles City...	Elm Spring.....	Ind...	H. D. White & Co.....	Charles City....	Charles City....	H. D. White.	Hd.					
20	Charles City...	St. Charles Creamery Ass'n	Co-op.	F. J. Powers, Sec....	Charles City....	Charles City....	Burr Loomer.....	Hd.					
<i>Greene County.</i>													
21	Dana.....	Dana Mutual Co-op. Or'y Co	Co-op.	J. A. Rowles, Sec....	Dana.....	Dana.....	W. J. Elling....	Test.					
22	Reinbeck	Reinbeck*	Stk Co	The Fowler Co.....	Waterloo.....	Reinbeck.....	G. A. Place.....	Test.					
<i>Guthrie County.</i>													
23	Jamaica.....	Jamaica Cheese Factory...	Ind...	A. H. Chadsey.....	Jamaica.....	Jamaica.....	A. H. Chadsey..	Hd.					
<i>Hancock County.</i>													
24	Britt..	Britt Dairy—B. & O.....	Ind...	Geo. P. Hardwick...	Britt.....	Britt.....	Geo. P. Hardwick.						
<i>Hardin County</i>													
25	Ellis	Ellis Cheese Factory.....	Stk Co	W. I. Clark, Mgr.....	Iowa Falls....	Iowa Falls.....	E. Clark.....	Hd.					

* Manufacture both butter and cheese.

CHEESE FACTORY LIST—CONTINUED.

Office record number.	LOCATED AT OR NEAR.	NAME OF CHEESE FACTORY.	Operated by individual, co-op or stock company.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF CHEESE-MAKER.	Method of receiving milk — by the test or by the hundred.	No. of D. O. test bottle.	No. of D. O. pette.
	Howard County.									
26	Oresco.....	Wm. Kellow, Jr.....	Ind....	Wm. Kellow, Jr.....	Oresco.....	Oresco.....	J. J. House.....	Hd.		
29	Oresco.....	Clover Leaf Cheese Factory	Ind....	J. J. House.....	Oresco.....	Oresco.....	J. J. House.....	Hd.		
	Humboldt County.									
28	Renwick.....	Fred Klasse Factory.....	Ind....	Barbara Klasse.....	Renwick.....	Renwick.....	John Rotenbler. .	Test.		
29	Renwick.	Fred Speich.	Ind....	Fred Speich.....	Renwick.	Renwick.....	Robert Wallen.....	Hd.		
30	Renwick.....	Elmer Factory	Ind....	Conrad Elmer.....	Renwick.	Renwick.....	Fred Fahrney.....	Hd.		
	Jefferson County.									
31	Pleasant Plain	Pleasant Plain	Ind....	W. J. Alter	Pleasant Plain	Pleasant Plain	W. J. Alter	Test.		
	County.									
32	Iowa City.....	Sharon Cheese Co.....	Co-op.	J. T. Jones, Sec	Iowa City.....	Iowa City.....	W. D. Berkey.....	Hd.		
	Jones County.									
33	Onslow.	Mineral Valley.....	Ind....	John Logan.....	Onslow	Onslow	Fred Grisnold	Hd.....	378	
	Keokuk County									
34	Talleyrand.....	Talleyrand.....	Stk Co	L. M. Tucker	Talleyrand	Keota.....	O. Tucker.....	Test...	86	
35	Webster.....	Webster Cheese Factory....	Ind....	M. M. Wheeler.....	Webster.....	Webster..	M. M. Wheeler.....	Hd.		
	Kossuth County.									
36	Luverne.	D. Marty's*	Ind....	D. Marty.....	Luverne.....	Luverne.....	Henry Jaster.....	Hd.		
37	Luverne	Pioneer.....	Stk Co	S. B. Hefty, Sec.....	Renwick.....	Luverne.....	Albert Staffen.....	Hd.		

<i>Lee County.</i>									
38	Denmark.....	Denmark.....	Ind...	Thos. J. Currier.....	Fort Madison...	Fort Madison...	W. E. Grifth.....	Hd.	
<i>Linn County.</i>									
39	Marion.....	Gray's.....	Ind...	Edw. C. Clark..	Cedar Rapids..	Cedar Rapids..	Mrs. W. E. Carol....	Hd.	
40	Springville..	Springville.....	Ind...	Edw. C. Clark.....	Cedar Rapids..	Cedar Rapids..	W. E. Carol.....	Hd....	123
<i>Marshall County.</i>									
41	Luray.....	Luray..	Ind...	Parsons Bros.....	Luray.....	Luray.....			
<i>Monroe County.</i>									
42	Albia.....	T.	Ind.		Albia.....	Albia.....		Hd....	724
43	Albia.....	Co-op	Co-op		Albia.....	Stakesburg...		Hd.	
44	Albia.....	factory	Ind...		Selection.....	Albia.....		Hd.	
45	Albia.....		Ind...		Albia.....	Albia.....		Hd.	
46	Albia.....		Ind...		Albia.....	Albia.....		Hd.	
47	Albia.....		Ind...		Albia.....	Albia.....	H. Grinn.....	Hd.	
48	Albia.....		Ind...		Albia.....	Albia.....	Harry Pharis.....	Hd.	
49	Albia.....	factory	Ind...		Albia.....	Albia.....	F. W. Crouch.....	Hd.	
50	Hilton.....		Ind...		Albia.....	Albia.....	A. G. Rowies.....	Hd.	
<i>Montgomery County.</i>									
51	Grant.....	Grant Cheese Factory.....	Ind...	John Hinton.....	Grant.....	Elliot.....	John Hinton.....	Hd.	
<i>Muscatine County.</i>									
51	Muscatine..	Muscatine French Oh. Fty.	Ind...	H. P. Schmidt..	Muscatine..	Muscatine..			
<i>Page County.</i>									
52	Northboro....	Northboro..	Ind...	W. E. Hatfield	Northboro....	Northboro....	W. E. Hatfield.....	Hd.	
<i>Pocahontas County.</i>									
54	Chester Center	Chester Center	Ind...	W. W. Sherman..	Chester Center	Grinnell.....	W. W. Sherman.....	Test..	1049
55	Grinnell.....	Neely's Cheese Factory	Ind...	J. E. Neely.....	Grinnell.....	Grinnell.....	W. J. Neely.....	Test..	1282
56	Jacobs.....	Jacobs.....	Ind...	A. O. Payne.....	Jacobs.....	Jacobs.....	John Boyd.....	Test..	1280
<i>Ringgold County.</i>									
57	Mc. Ayr.....	Liberty Cheese Co.....	Co-op.	J. E. Mah. Sec	Mc. Ayr.....	Mt. Ayr.....	J. S. Drury.....	Hd.	
58	Tingley.....	Tingley Cheese Factory	Ind...	Chas. Refner..	Tingley.....	Tingley.....			

* Manufacture both butter and cheese.

IOWA CHEESE FACTORY LIST—CONTINUED.

Office record number.	LOCATED AT OR NEAR.	NAME OF CHEESE FACTORY.	Operated by individual, co-op. or stock company.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF CHEESE-MAKER.	Method of receiving milk — by the test or by the hundred.	No. of D. C. test bottle.	No. of D. C. petite.
59	<i>Sac County.</i> Sac City	Blue Grass B. & C. Factory*	Ind . .	I. Hillman	Sac City	Sac City	Ferdinand Hillman	Test . .	769	
60	<i>Story County.</i> Ames	I. A. O. Cheese Factory*	State . .	G. L. McKay, Mgr.	Ames	Ames	G. L. McKay	Test . .	304	
61	<i>Tama County.</i> Dysart	Gold Dust Factory	Ind . .	B. E. Fairbanks	Rogerville	Dysart	P. B. Fairbanks	Hd.		
62	<i>Taylor County</i> Sharpsburg	F. M. Eastlack	Ind . .	F. M. Eastlack	Sharpsburg	Sharpsburg	F. M. Eastlack	Hd.		
63	<i>Warren County.</i> Milo	Belmont Cheese Factory	Ind . .	John Keller	Milo	Milo	Bell Parrett	Hd.		
64	<i>Washington County.</i> Clay	Clay . . . . .	.	O. Meacham, Sec.	Clay	Clay	M. L. Doane	Test.		
65	Dublin	Dublin Cheese Co.	Stk Co	H. Dickson	Dublin	Washington	M. L. Doane	Hd.		
66	West Chester	West Chester Cheese Fty	Co-op.	W. E. Leet, Mgr.	West Chester	West Chester . . . . .	.....	Hd.		
67	<i>Wayne County</i> Lineville	De Haan's Cheese Factory	Ind . .	Matthew De Haan	Lineville	Lineville	Matthew De Haan	Hd.		

* Manufacture both butter and cheese.

Thirteenth Annual Report

OF THE

STATE DAIRY COMMISSIONER

TO THE

GOVERNOR OF THE STATE OF IOWA

FOR THE YEAR 1899.

B. P. NORTON,

State Dairy Commissioner.

PRINTED BY ORDER OF THE GENERAL ASSEMBLY.

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F. R. CONAWAY, STATE PRINTER,

1900.

LETTER OF TRANSMITTAL.

To His Excellency, Leslie M. Shaw, Governor of Iowa:

SIR—In compliance with the law, I have the honor to submit herewith the thirteenth annual report of the dairy commissioner. Very respectfully,

October 14, 1899.

B. P. NORTON,
Dairy Commissioner.

PROSECUTIONS.

During the past summer this department has undertaken several prosecutions under the oleomargarine law and a few for adulteration of milk. The violators of the oleomargarine law have all been railroad contractors, who were attempting to feed their men on oleomargarine to save expense. Successful prosecutions were conducted as follows: Two at Ottumwa, three at Council Bluffs, one at Grundy Center. One man is now under bonds to appear before the grand jury at Toledo, and one man, who has not at this writing been arrested, is now under indictment in another part of the state. All the cases are based upon the portion of the law which forbids any one to have in his possession oleomargarine having a yellow color. In the cases tried no defense has been made and no particular expense has been incurred other than that of the dairy commissioner. In every case the oleomargarine is found in the original tub bearing the government stamp. Hence no analysis has been necessary.

A patron of the Clarksville creamery was prosecuted for watering his milk and delivering the same to the creamery. He was convicted and fined \$25 and costs. The law is so very plain and the Babcock test is so very sure that it is hard to understand why any patron of a creamery should be so shortsighted.

Prosecutions of city milk dealers for various offenses are set out in the part of this report devoted to the matter of city milk inspection.

The law could be much more fully enforced if this office were allowed additional assistance. There is no doubt that violations of the oleomargarine law are more or less frequent, but the detection and prosecution of the same takes a great deal of time and is more or less difficult. The collectors of internal revenue, while refusing, under instructions from their superiors, to give out any information in regard to shipments of "oleo," inform us in general terms that large quantities of it are shipped into the state. If so, most of it escapes the knowledge of this department.

CO-OPERATION IN IOWA CREAMERIES.

It is almost a self-evident proposition that all creameries are co-operative in their relation to the farmers, whether they are so in name or not. The farmer cannot do without the creamery as an institution, neither can the creamery be run at a profit to anybody if the patronage of the creamery is not sufficient. There is great room for improvement in the management of creameries in this and other states, so far as the relations of the patrons and the operator of the creamery are concerned. Distrust of the test and small profits on the one hand, and impatience with sour or bad milk on the other, lead to an antagonism that is disastrous to the partnership that exists in reality between the farmer and the creamery. Hence both suffer, when a little effort of "management" would relieve the situation greatly and be to the profit of both.

The number of requests sent to this office to test milk indicate that there is a growing interest on the part of some dairymen to know just what difference exists between the samples of milk from their different cows, and the creamery man will do well to foster this desire. If the farmer can get better cows he will make more profit, of course; will send more milk to the creamery, and forget that he ever said that the creamery cheated him, and that there is no money in dairying. Suggest to your patrons the advisability of getting a small hand tester and determining the difference between cows as regards profit; or test the milk for them, after explaining to them how to take proper samples. You will incidentally teach them some things about the test and gain their confidence by showing an interest in their welfare. If you succeed in getting them to replace their poor cows with good ones, you will get more milk at your creamery. At any rate, the more the farmer knows about dairying the better it will be for you and the creamery business as a whole.

Some of the larger creameries have adopted the plan of having a summer meeting of their patrons to talk over the

business, discuss creamery and dairy matters as a whole, and in particular as it affects them, and incidentally get better acquainted through the medium of a picnic. While this plan is impossible to a single small creamery, it is not at all difficult if neighboring creameries will get together, and as an attraction get some speakers of reputation to address the gathered farmers on dairy subjects. Don't have the discussion confined to the care of cans and the making of butter from a poor quality of milk. Give the farmer something that will help him to make more money out of his cows and it won't be difficult to make him keep his milk well.

Every creamery operator ought, for his own benefit, to be a self-appointed agent for the best dairy paper he knows. Modern dairying is not "the good old way," and the successful dairyman must learn how, if he has not already done so. Modern dairy literature is full of new things and helpful matter for both the dairyman and the creamery operator. Added interest on the part of the farmer will pay the creamery man big dividends. The creamery man who is not willing to do anything that will tend to educate his patrons, proceeding on the theory that the less they know the easier it will be to "work" them, can count on a business life of a few days and lots of trouble. Get your patrons to take the best dairy papers, teach them by good example how to care for their milk and the utensils of their dairies, help them in every way you can to make more out of their dairies, and you will increase your business and consequent profit. The creamery papers are full of instructions and advice to the butter-maker; the butter buyer is continually trying to have the butter-maker produce better butter, and takes great pains to inform him of the exact faults of his butter and how to avoid them. Why should not the creamery operator, acting on the same business principle, endeavor to increase the knowledge of his patrons by some other means than merely sending back the milk with some words equally sour? Help your patrons and they will help you.

The man who thinks that all the attention should be paid to the immediate interests of the creamery has an entirely wrong idea of dairying in Iowa. The basis of the creamery industry is not the man who makes the butter and sells it; the cow and the man who milks her constitute the basis, and when they do not produce milk at a profit there will be no need of creameries.

THEY PASTEURIZE THEIR SKIMMED MILK.

Seventy-eight creameries report that they pasteurize their skimmed milk before sending it back to the farmer, and all who express opinions about it say it is a great success. If the calves that drink the milk could be heard on the subject they would also be unanimous on the advisability of the practice.

Souring of milk, while it is of course a natural process, does not improve the feeding value of the milk. The milk must be sweet in order that all of its value may be obtained by feeding. In this day of small profits from butter-making, the farmer has a right to demand that the milk returned to him shall have all its original value except that removed by the separator. Pasteurization of the skimmed milk and cleanliness of the skimmed milk tank enables the creamery man to return the milk to the farmer in good condition. Skimmed milk contains practically all the elements of growth that were in the whole milk. Fats in feed go to furnish energy to the animal or fat to his body. The carbohydrates of grains will supply the place of the fats removed from the milk. But if the milk begins to sour, it is worth so much the less, and nothing can be added to it to take the place of the lost value. The farmer who receives his milk from the creamery sweet can substitute corn or ground flax seed for the fat that the creamery separator has taken out and raise as good a calf as though it had been fed whole milk. Pasteurize your skimmed milk; you will find it popular among your patrons.

FEED AND CARE OF COWS.

From the reports of Iowa creameries it is estimated that the average cow produces but 140 pounds of butter per annum. There is a large and increasing number of farmers in this state who have succeeded in making their cows produce from 200 to 350 pounds of butter in a year, and therefore there must be a great number of cows whose product falls far below the average in amount. The average value of the product of the cow cannot be more than \$20 or \$25, and the same sum cannot be far from the cost of the cow's keep. Hence the only apparent advantage in keeping cows is that of turning into an easily marketed product the bulky or possibly unsalable produce of the farm. But what is the use of so feeding a cow that she

will scarcely pay her board, when it is just as easy and almost as cheap to so feed her that she will return a handsome profit? There are two reasons for the small returns from our dairy business: the poor quality of some of the cows, and lack of proper feeding. It is the purpose of this article to discuss only the latter of these two points, in the hope that it will be of service to Iowa dairymen.

It will be readily admitted that it costs as much in feed to keep the cows alive and repair the waste of the body whether she is dry or produces 400 pounds of butter per year, for it is plain that it is only the excess of the feed that is turned into milk. If we can feed the cow something that is more suitable to milk production than she has been getting, she will certainly give more milk, and the only question to be determined will be whether the increase in milk is obtained at such a cost as to allow a profit. Of course it is not possible to make a great increase with every cow, no matter what the feed; neither is it possible to increase the milk production by a mere increase in the amount of the feed, unless it is the proper feed. It is easily seen that the farmer who has a dairy herd should attempt to keep cows that will give milk at a profit if properly fed, and then see to it that they are properly fed and handled.

The feeder must take account of three groups of substances in determining a ration for an animal; they are protein, carbohydrates, and fat. All analyses give the percentage of dry matter and the amount of digestible protein, carbohydrates and fat, and it is possible to arrange the amount of each of these in the feed to suit the purpose for which the animal is fed, whether it be for growth, increase in weight, or milk.

Protein furnishes the materials for the formation of the muscles, hair, brain and nerves, and the casein and albumin of milk. It is absolutely essential to the existence, growth and milk-giving powers of an animal, and no other substance in the feed can take its place. Protein may be used by the animal in the place of either the carbohydrates and fat and in case of too little feed it will be so used. The cow gives milk only after the waste of the body or growth is fully provided for, hence it is the excess of protein beyond the actual needs of the cow that enables her to produce milk.

Carbohydrates are the producers of fat in the body or are used up at once in the production of heat and energy.

Fat includes the fats of the plants or grain, and is also a producer of heat and energy and fat in the body. A pound of fat in a ration is equivalent to about 2.25 pounds of carbohydrates. Fats are often called ether extract.

It will be seen at once that if a cow receives too much of the fats and carbohydrates, she will not use all the feed she eats in the production of heat and energy and will, therefore, take on fat, and go dry. If at the same time the amount of protein in the feed is deficient, she will have an additional reason for not giving milk. Any combination of the feeds usually raised upon the farm makes just such a ration as here indicated, deficient in protein and having an excess of carbohydrates. It therefore follows that the feeder for milk must buy some feed which contains a large amount of protein in proportion to the carbohydrates, in order to balance the feeds he already has. He can avoid this in some measure by raising those feeds which contain the greatest proportion of protein, and under Iowa conditions the best feed for the farmer to raise is clover hay. The soja bean, and peas and oats, or alfalfa will do to experiment with, and if successfully grown will be more valuable than clover as a feed, but clover must be the mainstay of the farmer unless he prefers to raise something else that is a surer crop, and sell it to buy bran, oil meal, or some of the less common concentrates.

In the tables of comparative values of feed stuffs, found at the end of this article, are given the varying per cents of each of the nutrients in the common farm products and by-products. By long experiment it is found that the best results are obtained with milch cows of average size, in full flow of milk, when the cow receives the following amounts of the several materials per day:

Dry matter, 23 to 28 lbs. Protein, 2 to 2.5 lbs. Carbohydrates, 12 to 15 lbs. Fat, .4 to .8 lbs.

Note the weakness of the following ration:

	D. M.	DIGESTIBLE.		
		PRO.	C. H.	FAT
Timothy, 14 pounds.....	12.28	.48	6.08	.18
Barley meal, 4 pounds.....	3.52	.29	2.52	.08
Corn meal, 4 pounds.....	3.52	.36	2.70	.11
Oat meal, 4 pounds.....	3.68	.46	2.08	.24
Totals	23.00	1.59	13.38	.61

This ration has too much carbohydrates and fat and but little more than half the amount of digestible protein required for the maximum. On such a ration the cow will go dry and get fat. If a suitable amount of corn stover is fed instead of the timothy the ration is worse yet. If clover could be substituted it would greatly improve the ration, and probably the grains could be sold and bran or oil meal bought, not only to the advantage of the ration but to the pocket of the owner. It will nearly always be the case that the common grains can be sold and concentrates bought which will leave money in the pocket and put more in when the milk is sold.

If such a sale is made it is for the purpose of getting more protein than is already found in the grain or hay at hand. The farmer with the usual stock of feed already has too much carbohydrates, and buys bran or other feed for the protein there is in it. Hence the price for which he can afford to sell the grain, and the price he can afford to pay for the concentrate, is determined by the relative amounts of protein. For example, oats at 20 cents is worth \$12.50 per ton and contains 184 pounds of digestible protein. (See the table,) A ton of bran can usually be bought for less than \$12.50 and contains 250 pounds of protein. That is, the protein in the oats will bring in the market about 6.8 cents per pound, and the protein in the bran can be bought for 5 cents or less per pound.

Cows do best on some succulent feed. Mixed pasture grasses make the best of all feeds. The most successful winter ration will approximate as closely as possible to the grass ration. Ensilage or roots enables the winter ration to furnish the required succulence. Neither has any large amount of protein, but that can be furnished in the grain part of the ration and by the use of ensilage the greatest amount of feed per acre is obtained. If neither ensilage or roots are fed then some loosening feeds must be fed with the constipating feeds to obtain the best results. Loosening feeds are ensilage, roots, bran, linseed meal; constipating feeds are corn fodder and cornstalks, timothy and prairie hay, corn and cotton seed meal. The cow is a dainty animal and the feed should be clean and bright, as well as suitable in kind and quantity.

Most dairy cows drink too little water in the winter time. A sensible cow will not drink cold water when she is shivering with cold. Keep the cows warm. It will pay you to water them in the barn. They will not suffer for lack of exercise if

they are not turned out of the barn at all on the coldest days. Give a little salt with the feed every day. Don't turn the hungry cow out to the straw pile or into a field of cornstalks to fill up on such woody materials. She won't eat any more after she is full. Feed her that which will make her give the most milk for the least money, not that which will fill her up the cheapest. Raise all the clover you can and feed it to the milch cows. There is money in it. Study the following tables and rations and compound a balanced ration that will suit your condition. A serious decrease in the amount of milk given by the cow cannot be made up either by feeding, or otherwise. Keep the cow up to her maximum from the time she is fresh until she should go dry. The profitable cow is the one that gives a reasonable amount of milk ten months in the year. Persistency in milking is more or less of a habit, so milk the heifers as long as you can. A cow will give more milk if she is fresh in the fall than she will if she calves in the spring. By proper feeding she will give a full flow of milk all winter and as long as the grass is good in the summer, and will go dry in the late summer when feed is poor and flies are bad. But if summer dairying is practiced it will pay to have some kind of feed for the time when the pastures are drying up. The following table was intended for those who are in the habit of soiling their cows, but will be valuable here as suggesting the relative time of maturing of different feeds and the acreage of each kind to sow. Any surplus can be made into hay or fodder:

CROPS AND AREAS FOR SAME, FOR SOILING TEN COWS DURING THE ENTIRE SUMMER*.

CROP.	SEED PER ACRE.	TIME OF SEEDING.	AREA.	TIME OF CUTTING.
Rye.....	2 bushels	Sept. 10-15.....	½ acre..	May 20-May 30.
Wheat... ..	2 bushels	Sept. 10-15.....	½ acre..	June 1-June 15.
Red clover.....	20 pounds.....	July 15-Aug. 1	½ acre..	June 15-June 30.
Grass and clover	½ bu. red top... } ¼ bu. timothy.. } 10 lbs red clover }	September.....	¾ acre..	June 15-June 30.
Vetch and oats	8 bu. oats..... }	April 20	½ acre..	June 25-July 10.
Vetch and oats.....	50 lbs. vetch..... }	April 30	½ acre..	July 10-July 20.
Peas and oats	½ bu. Canada... }	April 20	½ acre .	June 25-July 10.
Peas and oats	½ bu. oats..... }	April 30	½ acre..	July 10-July 20.
Barnyard millet.....	1½ bu. Canada.. }	April 30	½ acre..	July 10-July 20.
Barnyard millet.	1 peck	May 10.....	½ acre..	July 25-Aug. 20.
Soja bean.....	1 peck	May 25.....	½ acre..	Aug. 10-Aug. 20.
Corn	18 quarts.....	May 10.....	½ acre..	Aug. 25-Sept. 15.
Corn .....	.....	May 20	½ acre..	Aug. 25-Sept. 10.
Corn .....	.....	May 30.....	½ acre..	Sept. 10-Sept. 20.
Hungarian	1 bushel.....	July 15.	½ acre..	Sept. 20-Sept. 30.
Barley and peas.....	1½ bu. each.....	August 5.	1 acre,..	Oct. 1-Oct. 20.

Hatch Experiment Station, Massachusetts.

The several rations following are compiled from various sources, and a study of them will undoubtedly suggest a proper combination of feeds suitable to Iowa conditions. Percentages given in tables of analyses are averages of a large number of analyses, and the numbers given by different authorities differ slightly. Feed stuffs not of best quality will be deficient in protein content. Every ration must have in it a fair proportion of the brains of the feeder. If the cow responds liberally to the feeding let her have more than the average amount of the grain ration. When she begins to go dry reduce the grain ration gradually. The rations here given are for cows in full flow of milk. The protein content of their ration should bear a proportion to the amount of milk given.

Study your cows and how to feed them; there is money in it. Make use of the bulletins published by the department of agriculture, and reports of dairy organizations; subscribe for a dairy paper, and use all the means possible to arrive at the result desired, namely, how to make the most money out of your dairy business.

In the following rations the word stover means the stalks of cut corn after the ears are removed. Fodder corn means the stalk and the ear fed together. Shredded corn stover is worth twice as much as unshredded, because when shredded the cows will eat all of it instead of only half.

All the usual feeds may be fed in any quantity desired, but three pounds of oil meal per day is the maximum amount to be fed. Feed grain rations and roughage separately; that is, feed the grain part of the ration and then feed all the roughage they will eat. The amounts given in the following rations are about what the average cow will consume. Any change in rations must be gradual. Two weeks is none too long to make a radical change of feed.

COMPARATIVE VALUE OF FEED STUFFS FOR DAIRY COWS.

Calculations based upon the percentage of digestible protein.

	PERCENTAGE COMPOSITION.			COMPARATIVE VALUE PER TON WHERE TIMOTHY IS WORTH—				
	Dry Matter	DIGESTIBLE			\$3.00	\$6.00	\$7.00	\$8.00
		Pro.	O-H.	Fat.				
GREEN FODDER.								
Corn fodder.....	20.70	1.9	11.6	.4	1.47	1.76	3.06	2.36
Oat fodder.....	27.80	2.7	22.7	1.0	3.97	4.76	5.96	6.35
Red clover.....	26.20	3.1	14.8	.7	4.56	5.47	6.96	7.89
Corn silage.....	20.9	1.0	11.4	.7	1.47	1.76	3.06	2.36
COARSE								
.....	50.50	2.0	22.4	.4	3.94	3.68	4.14	4.70
.....	47.40	2.5	24.6	1.3	3.68	4.41	5.15	5.96
.....	57.66	3.4	22.4	1.3	5.00	6	7	8.00
.....	51.80	10.6	37.3	1.4	15.88	12	21	26.06
.....	90.20	8.2	41.7	1.4	12.08	14	14	11
.....	87.75	7.6	40.9	1.6	11.13	12	12	17
.....	69.00	3.9	42.2	1.0	8.74	6	6	6
.....	60.10	4.3	42.0	1.4	7.04	6	6	11
.....	87.80	3.8	41.8	1.4	5.15	6	6	6
.....	84.10	3.4	41.5	1.3	5.00	6	6	6
.....	91.10	4.6	40.8	1.0	7.04	6	6	11
.....	86.84	3.4	45.3	1.1	6.00	6	6	6
.....	86.70	10.8	36.7	1.5	15.88	11	11	24
.....	83.80	1.0	32.0	.4	1.47	1	1	1
.....	91.61	1.5	43.4	.6	2.21	1	1	1
ROOTS AND TUBERS.								
Potatoes.....	24.55	2.1	20.2	.....	3.09	3.71	4.20	4.84
Sugar beets.....	15.00	1.6	12.2	.....	2.21	2.65	3.00	3.68
Mangels.....	14.00	1.6	9.0	1.0	2.21	2.65	3.00	3.68
Turnips.....	9.50	.8	6.6	.1	1.16	1.41	1.65	1.96
Suts-bagas.....	11.40	.9	7.7	.1	1.32	1.59	1.86	2.13
Carrots.....	11.40	.8	7.8	.3	1.16	1.41	1.65	1.96

	PERCENTAGE COM- POSITION.				COMPARATIVE VALUE PER TON WHEN BRAN IS WORTH—						
	Dry M't'r	DIGESTIBLE.			\$7.00	\$8.00	\$9.00	\$10.00	\$11.00	\$12.00	\$13.00
		Pro.	O-H	Fat.							
MILL PRODUCTS.											
Barley meal	88.10	7.4	63.9	2.0	4.14	4.74	5.33	5.92	6.51	7.10	7.70
Corn meal	88.00	9.0	67.4	2.8	5.04	5.76	6.48	7.20	7.92	8.64	9.36
Corn and cob meal ..	84.90	6.5	56.3	2.9	3.64	4.16	4.68	5.20	5.72	6.24	6.76
Oat meal	92.10	11.5	53.1	5.9	6.44	7.36	8.28	9.20	10.12	11.04	11.96
Pea meal	89.50	16.8	51.8	.7	9.41	10.75	12.10	13.44	14.78	16.13	17.47
BY PRODUCTS.											
Bran.	89.50	12.5	42.1	2.6	7.00	8.00	9.00	10.00	11.00	12.00	13.00
Buckwheat shorts...	88.90	21.1	33.5	5.5	11.82	12.49	13.19	13.88	14.57	15.25	15.94
Cotton seed meal....	91.86	22.0	20.2	10.0	17.92	20.48	23.04	25.60	28.16	30.72	33.28
Linseed meal	90.00	27.6	33.5	7.3	15.46	17.66	19.87	22.08	24.29	26.49	28.70
Gluten meal	90.00	24.5	47.0	6.7	12.72	15.68	17.64	19.60	21.56	23.52	25.48
Germ meal	93.00	12.3	52.4	6.1	6.89	7.87	8.86	9.84	10.82	11.81	12.79
Brewers' grains.....	91.10	14.7	36.6	4.8	8.28	9.41	10.58	11.76	12.94	14.10	15.29
(Dried)											
Brewers' grains	84.30	3.9	9.3	1.4	2.13	2.50	2.81	3.12	3.43	3.74	4.06
(Wet.)											
Malt sprouts.....	89.80	13.7	43.5	1.2	10.47	11.97	13.48	14.98	16.48	17.95	19.45
Shorts.....	89.50	10.0	55.9	2.3	5.60	6.40	7.20	8.00	8.80	9.60	10.40
GRAINS AND OTHER SEEDS.											
Barley	89.10	8.7	65.6	1.6	4.87	5.57	6.26	6.95	7.66	8.34	9.05
Corn	89.10	7.9	63.7	4.2	4.43	5.06	5.69	6.32	6.95	7.58	8.22
Flax	90.80	20.6	17.1	20.0	11.54	12.18	12.83	13.48	14.13	14.77	15.42
Millet seed	87.50	9.0	54.1	2.9	5.04	5.76	6.48	7.20	7.92	8.64	9.36
Oats	89.00	9.2	47.3	4.2	5.15	5.89	6.62	7.36	8.10	8.82	9.57
Peas.	90.16	19.4	59.6	.5	10.86	12.53	13.97	15.53	17.07	18.63	20.18
Rye.....	88.40	9.9	67.6	1.1	5.54	6.34	7.13	7.92	8.71	9.40	10.20
Wheat.....	89.00	11.0	58.6	1.6	6.16	7.04	7.93	8.80	9.68	10.56	11.44
PRICE PER BUSHEL ON ABOVE BASIS.					Ots.	Ots.	Ots.	Ots.	Ots.	Ots.	Ots.
Barley.....					11.7	13.4	15.0	16.6	18.4	20.0	21.7
Corn.....					12.4	14.2	15.9	17.7	19.5	21.3	23.0
Millet seed.....					12.1	13.8	15.6	17.3	19.0	20.7	22.5
Oats.....					8.2	9.4	10.6	11.8	13.0	14.2	15.3
Peas.....					22.6	27.6	41.9	46.6	51.2	55.9	60.5
Rye.....					15.5	17.7	19.9	22.1	24.4	26.6	28.8
Wheat.....					18.5	21.1	23.8	26.4	29.0	31.6	34.2

VALUE OF FEED STUFFS BASED UPON THEIR DIGESTIBLE PRO-
TEIN CONTENT.

Protein in Barley as a Basis.

KIND OF FEED.	WHEN BARLEY IS WORTH PER BUSHEL—							
	16 cts.	18 cts.	20 cts.	22 cts.	24 cts.	26 cts.	28 cts.	30 cts.
Corn	16.9	19.1	21.3	23.3	25.4	27.5	29.7	31.8
Oats	11.3	12.7	14.1	15.5	16.9	18.3	19.7	21.2
Rye	21.2	23.9	26.6	29.2	31.9	34.5	37.2	39.8
Wheat	25.3	28.4	31.6	34.8	37.9	41.1	44.2	47.4
Bran, per ton	\$ 9.48	\$10.78	\$11.97	\$13.17	\$14.27	\$15.58	\$16.76	\$ 17.96
Linseed meal	21.12	23.79	26.44	29.07	31.73	34.38	37.10	39.65

Protein in Corn as a Basis.

KIND OF FEED.	WHEN CORN IS WORTH PER BUSHEL—							
	16 cts.	18 cts.	20 cts.	22 cts.	24 cts.	26 cts.	28 cts.	30 cts.
Barley	15.0	17.0	18.9	20.8	22.7	24.5	26.4	28.3
Oats	10.6	12.0	13.3	14.6	16.0	17.3	18.6	20.0
Rye	20.0	22.6	25.1	27.6	30.1	32.6	35.1	37.6
Wheat	23.9	26.9	29.8	32.8	35.8	38.8	41.8	44.8
Bran, per ton	\$ 9.05	\$10.16	\$11.20	\$12.43	\$13.56	\$14.68	\$15.81	\$ 16.94
Linseed meal	19.98	22.42	24.94	27.44	29.92	32.40	34.93	37.44

Protein in Oats as a Basis.

KIND OF FEED.	WHEN OATS IS WORTH PER BUSHEL—							
	16 cts.	18 cts.	20 cts.	22 cts.	24 cts.	26 cts.	28 cts.	30 cts.
Barley.....	22.7	25.6	28.4	31.2	34.1	36.9	39.8	42.6
Corn.....	24.0	27.1	30.1	33.1	36.1	39.1	42.1	45.1
Rye.....	30.1	33.9	37.7	41.4	45.2	49.0	52.7	56.5
Wheat.....	35.9	40.4	44.8	49.3	53.8	58.3	62.8	67.3
Bran, per ton.....	\$12.58	\$15.29	\$16.99	\$18.69	\$19.53	\$22.08	\$23.78	\$ 25.49
Linseed meal.....	30.00	33.75	37.50	41.25	45.11	48.75	52.50	56.25

Protein in Rye as a Basis.

KIND OF FEED.	WHEN RYE IS WORTH PER BUSHEL—							
	16 cts.	18 cts.	20 cts.	22 cts.	24 cts.	26 cts.	28 cts.	30 cts.
Barley.....	12.0	13.6	15.1	16.6	18.1	19.6	21.1	22.6
Corn.....	12.8	14.4	16.0	17.6	19.2	20.7	22.3	23.9
Oats.....	8.5	9.6	10.6	11.7	12.7	13.8	14.9	15.9
Wheat.....	19.9	22.4	24.9	27.4	29.8	32.3	34.8	37.3
Bran, per ton.....	\$ 7.21	\$ 8.12	\$ 9.02	\$ 9.93	\$10.84	\$11.75	\$12.63	\$ 13.54
Linseed meal.....	15.91	17.87	19.85	21.85	23.85	25.80	27.80	29.80

All the foregoing tables are taken, with slight changes, from "Feeding Dairy Cows," Prof. T. L. Haecker, University of Minnesota.

RATIONS FOR DAIRY COWS.

FORMULA.	Organic mat- ter.	DIGESTIBLE NUTRIENTS.			FORMULA.	Organic mat- ter.	DIGESTIBLE NUTRIENTS.		
		Protein.	Carbohy- drates.	Fat.			Protein.	Carbohy- drates.	Fat.
20 lbs. red clover..	15.70	1.80	6.98	.38	20 lbs. clover hay..	15.70	1.80	6.98	.38
5 lbs. corn.....	4.88	.32	3.24	.25	4 lbs. bran	3.30	.50	1.76	.12
5 lbs. bran.....	4.12	.63	2.21	.15	4 lbs. ground oats..	3.44	.36	1.79	.16
Totals.....	24.20	2.25	12.43	.72	Totals	22.44	2.16	10.53	.60
20 lbs. clover hay...	16.94	1.36	7.16	.34	20 lbs. clover hay..	15.70	1.80	6.98	.38
5 lbs. corn.....	4.45	.40	3.24	.25	6 lbs. ground corn..	5.26	.38	2.89	.30
5 lbs. oats.....	4.45	.46	2.87	.21	4 lbs. bran	3.30	.50	1.76	.12
Totals	25.84	2.22	12.87	.77	Totals	24.26	2.18	12.63	.74
15 lbs. clover hay..	12.70	1.02	5.36	.26	15 lbs. clover hay..	12.70	1.02	5.37	.26
5 lbs. bran.....	4.40	.63	1.93	.15	6 lbs. corn stover..	3.57	.10	1.94	.04
2 lbs. corn	1.78	.16	1.33	.09	6 lbs. bran	5.29	.75	2.32	.18
2 lbs. oats.	1.78	.18	.94	.08	4 lbs. corn and cob	4.45	.32	3.15	.18
1 lb. oil meal. ....	.91	.29	.83	.07	meal.....				
10 lbs. stover.....	5.95	.17	3.24	.07	Totals.....	25.96	2.19	12.79	.66
Totals	27.53	2.45	13.13	.72	13 lbs. clover hay..	10.20	.85	4.54	.21
10 lbs. clover hay..	7.85	.65	3.49	.16	10 lbs. corn stover..	5.25	.20	3.34	.06
10 lbs. corn fodder..	6.68	.87	4.04	.12	4 lbs. oats.	3.44	.26	1.79	.16
6 lbs. bran	4.94	.75	2.65	.17	6 lbs. corn and cob	5.00	.40	3.38	.17
4 lbs. corn	3.50	.25	2.59	.20	meal				
1 lb. oil meal.....	.85	.28	.33	.07	1 lb. oil meal.....	.85	.28	.33	.07
Totals	23.82	2.30	13.10	.72	Totals	24.84	2.09	12.38	.67
20 lbs. clover hay..	16.94	1.36	7.16	.34	15 lbs. clover hay..	12.70	1.02	5.37	.26
4 lbs. bran	3.52	.50	1.54	.12	8 lbs. corn stover..	4.40	.14	2.59	.06
4 lbs. corn chop ...	3.56	.82	2.67	.17	6 lbs. bran	5.29	.75	2.32	.18
1 lb. oil meal.....	.91	.29	.33	.07	4 lbs. corn meal....	3.52	.32	2.67	.17
Totals	24.93	2.47	11.70	.70	Totals	25.91	2.23	12.95	.67
20 lbs. mammoth	15.76	1.14	6.40	.38	8 lbs. clover hay....	6.78	.54	2.86	.14
clover					15 lbs. corn stover..	8.98	.26	4.36	.11
4 lbs. bran ...					4 lbs. bran	3.52	.50	1.54	.12
4 lbs. corn and cob					4 lbs. corn chop ...	3.56	.32	2.67	.17
meal	3.56	.25	2.52	.14	2 lbs. oil meal.....	1.82	.59	.65	.14
1 lb. cotton see	.92	.37	.17	.09	Totals ...	24.61	2.21	12.58	.68
meal					15 lbs. clover hay..	12.70	1.02	5.37	.26
Totals	23.76	2.26	10.63	.72	10 lbs. corn stover..	5.97	.17	3.24	.07
20 lbs. clover hay..	16.94	1.36	7.16	.34	4 lbs. corn and cob	3.56	.32	2.52	.14
8 lbs. corn and cob	7.12	.51	5.04	.28	meal				
meal ..					4 lbs. bran.....	3.52	.50	1.54	.12
1½ lbs. oil meal....	1.36	.44	.49	.11	1 lb. oil meal .....	.91	.29	.33	.07
Totals.....	25.42	2.31	12.69	.73	Totals	26.65	2.30	13.00	.66
Give all the fodder and stover in addition					15 lbs. clover hay..	12.71	1.02	5.37	.26
that any cow will eat.					10 lbs. corn stover..	5.95	.17	3.24	.07
20 lbs. clover hay..	16.94	1.34	7.16	.34	6 lbs. bran	4.40	.63	1.93	.15
5 lbs. (corn) chop...	4.45	.40	3.23	.22	5 lbs. ground corn..	4.45	.40	3.24	.22
4 lbs. bran.....	3.52	.50	1.54	.12	Totals	27.51	2.22	13.88	.70
1 lb. oil meal .....	.91	.29	.33	.07	14 lbs. clover	12.28	1.06	5.60	.21
Totals	25.82	2.53	12.36	.75	4 lbs. barley meal..	3.52	.29	2.52	.08
12 lbs. clover hay..	10.16	.82	4.30	.20	4 lbs. corn meal....	3.52	.26	2.70	.11
10 lbs. corn stover.	5.95	.17	3.24	.07	4 lbs. oat meal.....	3.68	.46	2.08	.24
5 lbs. bran.....	4.41	.63	1.93	.15	Totals	23.00	2.17	12.90	.64
2 lbs. corn	1.78	.16	1.33	.09	14 lbs. clover ..	12.28	1.06	5.60	.21
2 lbs. oats.....	1.78	.18	.95	.08	4 lbs. barley meal..	3.52	.29	2.52	.08
1 lb. barley .....	.89	.09	.66	.02	4 lbs. corn meal....	3.52	.26	2.70	.11
1 lb. oil meal.....	.85	.28	.33	.07	4 lbs. bran	3.52	.50	1.54	.12
Totals	25.82	2.33	11.74	.68	Totals	22.90	2.21	12.51	.54

RATIONS FOR DAIRY COW—CONTINUED.

FORMULA FOR RATION.	Dry matter.	DIGESTIBLE NUTRIENTS.			FORMULA FOR RATION.	Dry matter.	DIGESTIBLE NUTRIENTS.		
		Protein.	Carbohy- drates.	Fat.			Protein.	Carbohy- drates.	Fat.
40 lbs silage.....	10.56	.52	5.60	.28	30 lbs. silage.....	7.92	.39	4.20	.21
15 lbs stover.....	8.93	.26	4.86	.11	5 lbs. hay.....	4.27	.24	1.98	.08
5 lbs. bran.....	4.40	.63	1.93	.15	5 lbs. stover.....	5.95	.17	3.24	.07
5 lbs. corn.....	4.45	.40	3.34	.21	6 lbs. bran.....	5.29	.75	2.32	.13
1 lb. cotton seed meal.....	.92	.37	.17	.12	3 lbs. malt sprouts	2.70	.56	1.11	.04
Totals.....	29.26	2.18	15.90	.87	Totals.....	26.13	2.11	12.85	.56
30 lbs. silage.....	7.92	.39	4.20	.21	30 lbs. silage.....	7.92	.39	4.20	.21
10 lbs. hay.....	8.58	.48	3.96	.16	10 lbs. hay.....	8.78	.60	4.32	.15
6 lbs. bran.....	5.29	.75	2.32	.18	20 lbs. roots.....	2.23	.16	1.56	.04
3 lbs. cotton seed meal.....	1.84	.74	.34	.18	4 lbs. bran.....	3.52	.50	1.54	.12
Totals.....	23.63	2.36	10.88	.73	2 lbs. oil cake.....	1.82	.50	.65	.14
25 lbs. silage.....	6.60	.33	3.50	.18	Totals.....	24.82	2.24	12.37	.66
8 lbs. hay.....	6.82	.22	3.47	.11	30 lbs. silage.....	7.26	.39	4.20	.21
8 lbs. stover.....	4.76	.14	2.59	.05	10 lbs. hay.....	8.00	.60	3.80	.15
5 lbs. bran.....	4.41	.63	1.93	.15	8 lbs. bran.....	6.59	1.00	3.53	.22
5 lbs. ground corn	4.45	.40	3.33	.22	2 lbs. middlings...	1.69	.24	.94	.05
2 lbs. oil meal.....	1.81	.59	.65	.14	Totals.....	23.54	2.23	12.47	.65
Totals.....	28.85	2.31	15.47	.86	25 lbs. silage.....	6.60	.33	3.50	.18
25 lbs. silage.....	6.60	.43	3.50	.18	10 lbs. clover hay..	8.47	.68	3.58	.17
10 lbs. clover hay..	8.47	.68	3.58	.17	5 lbs. bran.....	4.40	.63	1.93	.15
7 lbs. bran.....	6.17	.68	2.70	.21	2 lbs. cotton seed meal.....	1.84	.74	.34	.24
3 lbs. middlings...	2.64	.38	1.59	.10	Totals.....	21.31	2.38	9.35	.74
3 lbs. corn.....	2.67	.24	2.00	.12	20 lbs. silage.....	5.28	.26	2.80	.14
Totals.....	26.55	2.61	13.37	.79	10 lbs. clover hay..	8.47	.68	3.58	.17
20 lbs. silage.....	5.28	.26	2.80	.14	4 lbs. bran.....	3.52	.50	1.54	.14
10 lbs. stover.....	5.95	.17	3.24	.07	4 lbs. gluten feed.	3.69	.81	1.94	.12
5 lbs. hay.....	5.15	.29	2.33	.10	2 lbs. corn meal...	1.78	.16	1.23	.09
6 lbs. bran.....	5.29	.75	2.32	.18	Totals.....	22.74	2.41	11.19	.64
2 lbs. oil meal.....	1.82	.59	.65	.14	20 lbs. silage.....	5.28	.26	2.80	.14
Totals.....	23.49	2.66	11.39	.63	10 lbs. timothy hay	8.68	.28	4.24	.14
And straw <i>ad libitum</i> .					2 lbs. oil meal....	1.82	.59	.65	.14
30 lbs. corn silage..	7.80	.36	4.50	.18	2 lbs. corn meal...	1.78	.16	1.23	.09
15 lbs. timothy.....	4.38	.17	2.17	.06	8 lbs. bran.....	7.05	1.09	3.09	.24
4 lbs. barley meal.	3.52	.29	2.52	.06	Totals.....	24.61	2.29	12.21	.75
8 lbs. bran.....	7.16	1.00	3.39	.28	20 lbs. silage.....	3.28	.26	2.80	.14
1 lb. oil meal.....	.90	.28	.34	.07	10 lbs. timothy hay	8.68	.28	4.24	.14
Totals.....	23.76	3.10	12.92	.67	2 lbs. oil meal....	1.82	.59	.65	.14
30 lbs. ensilage.....	7.80	.36	4.50	.18	2 lbs. corn meal...	1.78	.16	1.23	.09
6 lbs. clover.....	5.27	.46	2.40	.09	8 lbs. bran.....	2.64	.38	1.16	.24
4 lbs. barley meal.	3.52	.29	2.52	.06	3 lbs. gluten feed.	2.77	.61	2.45	.15
8 lbs. bran.....	7.16	1.00	3.39	.28	Totals.....	22.87	2.28	11.73	.99
Totals.....	23.76	3.11	12.81	.63	20 lbs. mixed hay..	17.16	.96	7.82	.22
12 lbs. prairie hay..	10.50	.42	5.03	.17	4 lbs. corn and cob meal.....	3.56	.26	2.52	.14
10 lbs. bran.....	8.81	1.26	3.86	.30	4 lbs. barley.....	3.56	.35	2.61	.26
4 lbs. corn.....	3.56	.32	2.67	.17	2 lbs. oil meal....	1.91	.59	.65	.14
2 lbs. oil meal.....	1.82	.59	.65	.14	Totals.....	26.19	2.16	12.61	.66
Totals.....	24.69	2.59	12.20	.78	20 lbs. hay.....	16.34	.82	8.34	.14
17 lbs. timothy hay	14.76	.48	7.48	.24	4 lbs. bran.....	3.25	.50	1.76	.12
5 lbs. rye bran	4.42	.58	2.53	.10	4 lbs. corn.....	3.50	.26	2.59	.20
4 lbs. buckwheat middlings....	3.49	.88	1.34	.21	2 lbs. oil meal....	1.70	.57	.66	.14
1 lb. oil meal.....	.91	.29	.32	.07	Totals.....	24.84	2.15	12.35	.69
Totals.....	23.58	2.23	11.67	.62					

RATIONS FOR DAIRY COW—CONTINUED.

FORMULA FOR RATION.	Dry matter.	DIGESTIBLE NUTRIENTS.				FORMULA FOR RATION.	Dry matter.	DIGESTIBLE NUTRIENTS.			
		Protein.	Carb.	Fat.				Protein.	Carb.	Fat.	
10 lbs. prairie hay ..	8.13	.85	4.18	.14		20 lbs. mixed hay ..	16.08	.4	7.88	.38	
10 lbs. oat hay	8.49	.48	4.54	.15		4 lbs. ground corn ..	3.40	.35	3.89	.30	
5 lbs. bran	4.94	.75	2.66	.17		4 lbs. bran	3.30	.50	1.78	.18	
2 lbs. oil cake	1.70	.87	.66	.14		2 lbs. oil meal	1.70	.87	.66	.14	
Totals	23.26	2.10	12.14	.60		Totals	24.48	2.26	12.89	.74	
12 lbs. timothy hay ..	11.41	.34	5.21	.17		20 lbs. mixed hay ..	17.15	.95	7.98	.38	
10 lbs. corn stover ..	5.95	.17	3.24	.07		20 lbs. mangels	2.73	.38	1.62	.08	
5 lbs. bran	4.40	.75	1.98	.15		5 lbs. bran	4.41	.63	1.98	.15	
4 lbs. gluten feed ..	3.68	.75	1.94	.20		1 lb. cotton seed meal .....	.92	.27	.17	.09	
1 lb. oil meal .....	.91	.83	.53	.07		Totals	24.29	2.29	11.64	.59	
Totals	25.37	2.25	12.65	.69		12 lbs. mixed hay ..	10.80	.58	5.79	.19	
16 lbs. mixed hay ..	14.67	.85	7.09	.25		10 lbs. corn stover ..	5.95	.17	3.24	.07	
4 lbs. bran	2.90	.50	1.78	.18		4 lbs. ground corn ..	3.56	.38	3.67	.17	
4 lbs. corn and oats ..	3.47	.31	3.12	.18		4 lbs. bran	3.33	.50	1.54	.18	
2 lbs. oil meal	1.70	.87	.66	.14		1 lb. oil meal .....	.91	.87	.66	.14	
Totals	23.14	2.23	11.70	.69		Totals	24.24	1.86	12.68	.68	
19 lbs. timothy hay ..	8.63	.45	4.64	.10		12 lbs. prairie hay ..	9.78	.48	5.08	.17	
10 lbs. prairie hay ..	8.13	.36	4.18	.14		10 lbs. corn stover ..	5.95	.17	3.24	.08	
5 lbs. bran	6.60	1.00	3.55	.23		10 lbs. bran	3.24	1.16	4.41	.39	
4 lbs. oats	3.44	.36	1.79	.18		1 lb. oil meal .....	.91	.26	.38	.07	
Totals	26.79	2.16	14.14	.63		Totals	24.56	2.17	12.10	.69	
15 lbs. oat straw ..	12.35	.24	6.91	.10		12 lbs. timothy hay ..	9.80	.36	5.27	.14	
10 lbs. bran	8.34	1.26	4.41	.20		10 lbs. corn stover ..	5.95	.17	3.24	.08	
5 lbs. oats	4.30	.45	2.34	.23		4 lbs. cob meal	2.24	.39	2.25	.13	
Totals	25.29	1.96	12.86	.61		4 lbs. bran	3.80	.60	1.78	.18	
10 lbs. oat hay	9.11	.43	4.64	.15		2 lbs. middlings ..	1.69	.25	.94	.06	
10 lbs. corn stover ..	5.95	.17	3.24	.07		2 lbs. oil meal	1.70	.87	.66	.14	
4 lbs. ground corn ..	3.56	.38	3.67	.17		Totals	25.57	2.14	14.28	.68	
4 lbs. bran	3.53	.50	1.54	.18		10 lbs. millet	9.23	.45	5.17	.13	
2 lbs. oil meal	1.82	.89	.85	.14		10 lbs. stover	5.95	.17	3.24	.07	
Totals	28.06	2.01	12.44	.65		5 lbs. bran	4.41	.63	1.98	.15	
25 lbs. corn stover ..	14.90	.43	8.10	.18		5 lbs. corn and cob meal	4.43	.33	3.15	.18	
10 lbs. bran	8.81	1.26	3.86	.30		2 lbs. oil meal	1.82	.89	.85	.14	
2 lbs. oil meal	1.83	.89	.85	.14		Totals	25.85	2.16	12.11	.67	
Totals	25.58	2.38	12.61	.68		15 lbs. corn fodder ..	10.08	.58	6.08	.18	
20 lbs. corn stover ..	11.90	.34	5.44	.14		10 lbs. millet hay ..	8.63	.45	4.64	.10	
20 lbs. beets	4.05	.33	2.08	.08		10 lbs. bran	3.24	1.16	4.41	.39	
4 lbs. corn	3.56	.38	3.67	.17		Totals	26.89	2.27	15.11	.67	
6 lbs. buckwheat middlings ..	5.24	1.23	2.00	.33		12 lbs. mixed hay ..	11.41	.34	4.75	.19	
Totals	24.75	2.21	14.21	.66		8 lbs. corn stover ..	4.76	.18	3.23	.06	
12 lbs. mixed hay ..	10.80	.58	4.75	.19		4 lbs. bran	3.73	.50	1.54	.18	
10 lbs. stover	5.95	.17	3.24	.07		4 lbs. gluten feed ..	3.69	.75	1.94	.20	
4 lbs. corn and cob meal ..	3.56	.38	3.67	.17		Totals	22.37	2.02	11.48	.63	
4 lbs. buckwheat middlings ..	5.49	.28	1.34	.23		6 lbs. mixed hay ..	5.15	.29	2.28	.10	
2 lbs. bran	2.64	.88	1.10	.09		5 lbs. millet hay ..	4.61	.28	2.59	.07	
Totals	25.94	2.27	12.01	.71		10 lbs. stover	5.95	.17	3.24	.07	
15 lbs. timothy hay ..	12.35	.45	6.59	.18		4 lbs. bran	3.53	.50	1.54	.18	
5 lbs. oats	7.74	.39	4.08	.36		4 lbs. corn chop ..	3.56	.38	3.67	.17	
5 lbs. bran	4.94	.75	2.66	.17		2 lbs. oil meal	1.70	.87	.66	.14	
3/4 lb. oil meal .....	.43	.14	.16	.04		Totals	23.91	2.10	12.07	.67	
Totals	25.47	2.16	12.41	.75		20 lbs. fodder corn ..	11.66	.41	6.53	.24	
15 lbs. prairie hay ..	12.13	.53	6.27	.21		10 lbs. bran	3.24	1.16	4.41	.39	
10 lbs. bran	8.81	1.26	3.86	.30		2 lbs. oil meal	1.80	.86	.97	.14	
2 lbs. oil meal	1.83	.89	.85	.14		Totals	23.81	2.21	11.86	.74	
Totals	22.78	2.28	10.78	.69							

DAIRY LAWS OF IOWA.

CHAPTER 13.

OF THE DAIRY COMMISSIONER AND IMITATION DAIRY PRODUCTS.

SECTION 2515. *Appointment—bond—powers and duties of commissioner—report.*—On or before the first day of April of each even numbered year, the governor shall appoint a dairy commissioner, who shall have a practical knowledge of and experience in the manufacture of dairy products, and hold his office for two years from the first day of May following his appointment, and until his successor is appointed and qualified, subject to removal by the governor for inefficiency, neglect or violation of duty. He shall give bond in the sum of \$10,000, conditioned for the faithful performance of his duties, with sureties to be approved by and filed with the secretary of state. He shall keep on hand a supply of standard test tubes or bottles and milk measures or pipettes adapted for use by each milk testing machine, the manufacturers or dealers of which have filed with the dairy commissioner a certificate from the director of the Iowa agricultural experiment station, which shall certify that said milk testing machine, when properly and correctly operated, will produce accurate measurements of butter fat, and furnish to any person or corporation desiring the same for testing milk one such tube or bottle, and such milk measure or pipette for each factory, of the kind adapted for the machine operated therein, upon request therefor, certifying it to be accurate, reliable and standard, placing thereon the letters "D. C." as a permanent mark; the tubes or bottles and pipettes to be furnished at the actual cost thereof. He shall have and keep an office in the capitol, and preserve therein all correspondence, documents, records and property of the state pertaining thereto, and may, when necessary, employ a clerk at an expense of not more than \$75 per month. During his term of office he shall hold no other official position nor any professorship in any state educational institution, and on or before the first day of November shall make annual report to the governor, which shall contain a detailed account of all his doings as commissioner, and the receipts and disbursements of his office since the preceding report, with such facts and statistics in regard to the production, manufacture and sale of dairy products, with such suggestions as he may regard of public importance in connection therewith. In the conduct of his office, he shall have power to issue subpoenas for witnesses, enforce their attendance, and examine them under oath by him to be administered, such witnesses to be allowed fees as in justices' courts, to be paid by the commissioner as part of the expenses of his office, and do such other acts and things as are necessary and proper in the enforcement of the provisions of this chapter.

SEC. 2516. *Imitation butter or cheese.*—Every article, substitute or compound, save that produced from pure milk or cream from milk of cows, made in the semblance of or designed to be used for and in the place of butter, is imitation butter; and every article, substitute or compound, save that produced from pure milk or cream from milk of cows, made in the semblance of or designed to be used for and in the place of cheese, is imitation cheese. No one shall manufacture, have in his possession, offer to sell or sell, solicit or take orders for delivery, ship, consign or forward by any common carrier, public or private, and no common carrier shall knowingly receive or transport, any such imitation butter or cheese, except in the manner and subject to the regulations in this chapter provided.

SEC. 2517. *Substitute for butter or cheese—regulations as to sale and use—transportation.*—A substitute for butter and cheese, not having a yellow color nor colored in imitation of butter and cheese as prohibited in the next section, may be manufactured, kept in possession, offered for sale, sold, shipped, consigned or forwarded by common carriers, public or private, if each tub, firkin, box or other package in which the same is kept, offered for sale, sold, shipped, consigned or forwarded shall have branded, stamped or marked on the side or top thereof in the English language, in a durable manner, the words, "Substitute for butter" or "Substitute for cheese," as the case may be, the letters of the words to be not less than one inch in length by one-half inch in width. The defacing, erasure, canceling or removal of this brand or mark, with intent to mislead, deceive, or violate any provision of this chapter, is prohibited. Such substitute for butter or cheese may be kept, used or served as a food or for cooking in hotels, restaurants, lunch counters, boarding houses or other places of public entertainment, only in case the proprietor or person in charge of such place shall display and keep constantly posted a card opposite each table or other place where the guests or others are served with the same, which card shall be white, at least ten by fourteen inches in size, the words, "Substitute for butter used here" or "Substitute for cheese used here," as the case may be, printed in black Roman letters of the same size as herein required to be placed upon the tubs, firkins, boxes or other package in which substitute for butter or cheese is kept, and no other words or figures shall be printed thereon. No substitute for butter or cheese shall be offered for sale in the manufacturer's original package under the name of or for true butter or cheese made from the milk or cream of cows, nor shall any substitute for butter or cheese be offered for sale or sold unless the purchaser at the time was informed thereof, and, in addition, furnished with a printed statement in the English language in prominent type that the substance sold is such substitute, and giving the name and place of business of the maker. Nothing herein contained, however, shall be so construed as to prohibit the transportation of imitation butter or cheese through and across the state.

SEC. 2518. *Coloring—adulteration.*—No one shall color with any matter whatever any substance intended as a substitute for butter or cheese, so as to cause it to resemble true dairy products, or combine any animal fat, vegetable oil or other substance with butter or cheese, or combine with any substance whatever, intended as a substitute for butter or cheese, any thing of any kind or nature for the purpose or with the effect of imparting to the compound the color of yellow butter or cheese, the product of the

milk or cream from cows, or use, solicit orders for delivery, keep for sale or sell any such substance so colored and disguised as a substitute for butter or cheese; but nothing in this chapter shall be construed to prohibit the use of salt, rennet or harmless coloring matter in making butter or cheese from such milk or cream.

SEC. 2519. *Package branded*.—No one shall have in his possession or under his control, except for the actual consumption of himself or family, any substance designed as a substitute for butter or cheese, unless the tub, firkin, box or package holding the same is branded or marked as in this chapter required. Any person having in his possession or under his control such substance, not so branded or marked, shall be presumed to know its true character and name.

SEC. 2520. *Contracts invalid*.—No action shall be maintained in any of the courts of the state upon any contract or sale made in violation of or with the intent to violate any provision of this chapter by one who was knowingly a party thereto

SEC. 2521. *Search warrants—samples*.—Whoever shall have in possession or control any imitation butter or cheese, or any substance designed to be used as a substitute for butter or cheese contrary to the provisions of this chapter, shall be held to have possession of property with intent to use it as a means of committing a public offense, and all the provisions of the chapter relating to search warrants and proceedings thereon shall apply, except the officer serving the warrant, in addition to his duties as therein required, shall deliver to the dairy commissioner, or to a person by him authorized in writing to receive the same, a perfect sample of each article seized by virtue of such warrant, for the purpose of having the same analyzed, and forthwith return to the person from whom it was taken the remainder of each article seized. If any sample is found to be imitation butter or cheese, or substance designed to be used as a substitute for butter or cheese, it shall be returned to and retained by the magistrate for the purposes contemplated in said chapter on "search warrants and proceedings thereon," but if any sample be found not imitation butter or cheese, or a substance designed to be used as a substitute therefor, the value of the same shall be paid by the dairy commissioner as a part of the expenses of his office, to the person from whom it was taken.

SEC. 2522. *Milk dealers—manufacturers and packers—reports*.—Every city milk dealer, or every person furnishing milk or cream to such dealer, or the employe of such milk dealer, and every person or corporation, or the employe of such person or corporation, who operates a creamery, cheese or condensed milk factory, or re-works or packs butter, shall maintain his premises and utensils in a clean and hygienic condition, and shall make, upon blanks furnished by the dairy commissioner, such reports and statistics as may be required for the purpose of compiling statistics authorized by this chapter, and such dealer, owner, operator or business manager shall make such returns and reports in the manner and in the time prescribed by the commissioner, and certify to the correctness thereof.

SEC. 2523. *Milk test*.—Any person or corporation, or the employe of such person or corporation, who operates a creamery or cheese or condensed milk factory, and uses a chemical milk test to determine the quantity of butter fat in milk, purchased, used or received, shall so use only such tests

as shall be clear oil, free from any foreign substance, and produce correct measurements of butter fat, and every such person or corporation using a milk test shall procure from the dairy commissioner for each factory so operated one standard tube or bottle, and one standard measure or pipette, for testing milk, certified and marked by him as in this chapter provided, which shall be kept for inspection by the patrons and used by such person or corporation in testing or verifying test tubes or bottles and milk measures or pipettes used. In any action arising between any such operator and patron, the burden of establishing the use of reliable tests and the results therefrom, equivalent to the standard herein provided, shall be upon the operator.

SEC. 2524. *Samples collected.*—The commissioner may appoint agents in any city having over 10,000 inhabitants to collect from each dealer, not more than four times each month, samples of milk offered for sale therein. The agent shall make an accurate test of each sample received by him, and keep a true record thereof, with the name and location of the person from whom it was obtained, and report his work in detail to the commissioner, the compensation therefor not to exceed three dollars for each day actually employed therein.

SEC. 2525. *Permits.*—Any person or corporation who shall sell milk or cream from a wagon, depot or store, or sell or deliver milk or cream to a hotel or restaurant or boarding house, or any public place in any such city, shall be considered a city milk dealer. No such city milk dealer shall sell milk or cream from a wagon, depot or store in any such city without a written permit from the commissioner for each wagon, depot or store operated by him, for which he shall pay annually one dollar. All permits shall expire on the fourth day of July of each year, and no permit shall be issued for less than one dollar.

SEC. 2526. *Inspection.*—He or his agent may open any can or vessel containing milk or cream offered for sale in such city, and inspect its contents and take samples therefrom for testing and analysis. And any city milk dealer or employe of such milk dealer, or any other person who shall resist or interfere with the commissioner or his agent in the performance of his duties in executing any of the requirements of this chapter, shall be guilty of a misdemeanor and punished as provided in this chapter.

SEC. 2527. *Penalties.*—Whoever shall violate any provision of this chapter shall be punished by a fine not exceeding five hundred dollars, or by imprisonment in the county jail not exceeding six months, or by both such fine and imprisonment, at the discretion of the court.

SEC 2528. *Compensation—expenses.*—The commissioner shall be allowed necessary postage, stationery and office supplies, and shall receive an annual salary of fifteen hundred dollars and necessary expenses, which shall not exceed three thousand dollars per year; such expenses to be itemized, verified by him, and, when examined and approved by the executive council, to be paid upon a warrant of the state auditor drawn upon the state treasurer. The salary of the clerk shall be paid in the same manner.

FROM CHAPTER 10, TITLE 24, CODE.

SEC. 4989. *Sale of impure or skimmed milk—skimmed milk cheese—labeling* —If any person shall sell, exchange, or expose for sale or exchange or deliver or bring to another, for domestic or potable use, or to be converted into

any product of human food, any unclean, impure, unhealthy, adulterated, unwholesome or skimmed milk, or milk from which has been held back what is commonly known as strippings, or milk taken from an animal having disease, sickness, ulcers, abscess or running sore, or which has been taken from an animal within fifteen days before or five days after parturition; or if any person, having cows for the purpose of producing milk or cream for sale, shall stable them in an unhealthy place or crowded manner, or shall knowingly feed them food which produces impure, unwholesome milk, or shall feed them distilled glucose or brewery waste in any state of fermentation, or upon any substance in a state of putrefaction or rottenness or of an unhealthy nature, or shall sell or offer for sale cream which has been taken from milk the sale of which has been prohibited, or who shall sell or offer for sale, as cream an article which shall contain less than the amount of butter fat as prescribed in this chapter; or if any person shall sell or offer for sale any cheese manufactured from skimmed milk, or from milk that is partly skimmed, without the same being plainly branded, stamped or marked on the side or top of both cheese and package, in a durable manner, in the English language, the words "skimmed milk cheese," the letters of the words to be not less than one inch in height and one-half inch in width, he shall be fined not less than twenty-five nor more than one hundred dollars, and be liable for double damages to the person or persons upon whom such frauds shall be committed; but the provisions of this section shall not apply to skimmed milk when sold as such and in the manner and subject to the regulations prescribed in this chapter.

SEC. 4990. *What deemed adulterated or impure milk.*—For the purposes of this chapter, the addition of water or any other substance or thing to whole milk or skimmed milk or partially skimmed milk is hereby declared an adulteration, and milk which is obtained from animals fed upon waste as defined in this chapter, or upon any substance of an unhealthy nature, is hereby declared to be impure and unwholesome, and milk which is proved by any reliable method of test or analysis to contain less than twelve and one-half per cent of milk solids to the hundred pounds of milk, or than three pounds of butter fat to one hundred pounds of milk, shall be regarded as skimmed or partially skimmed milk, and every article not containing fifteen per cent or more of butter fat shall not be regarded as cream

SEC. 4991. *Enforcement.*—It is hereby made the duty of the dairy commissioner to enforce the provisions of the two preceding sections.

AN INCH OF CREAM.

The dairy commissioner's office has had a number of inquiries as to the proper diameter of a cream pail in which the cream may be measured in inches. The law does not specify any size for the pail, except as follows:

Code Sec. 3013. The unit or standard measure of capacity for liquids, from which all other measures of liquids shall be derived and ascertained, shall be the standard gallon and its parts, as furnished this state by the

government of the United States. The inch or gauge, of cream, shall be one-half of a standard gallon.

A pail 12.126 inches, approximately $12\frac{1}{8}$ inches in diameter, will hold one-half a gallon for every inch in depth. A variation of one-eighth of an inch in the diameter will make a difference of about 2 per cent in the capacity of the pail.

OLEOMARGARINE.

The most prosperous industry in the country, judging from the increase of production, is the oleomargarine trade. If this state or any other were able to increase the production of butter 60 per cent in one year it would be deemed almost a miracle. But the oleo manufacturer can and does so increase the output of his factory at will, the only limitation being the market which he supplies. The United States government collects a tax of 2 cents a pound on the manufacture of oleo, and hence has records showing the exact number of pounds made in any given time. The following table shows the production of oleo for the last twelve years. The year ends June 30th of each year:

Year.	Pounds.
1888	21,513,537
1889	34,325,527
1890	35,664 026
1891	44,392,409
1892	48,364,155
1893	67,224,298
1894	69,632 246
1895	56 958 105
1896	50,853,234
1897	45,531,207
1898	57,516,136
1899	87,800,000

Practically all of the oleo made is sold to the consumer and eaten as butter. Iowa creameries made last year about the same number of pounds of butter as the oleo factories made of their product. It is evident at once that if the creameries of Iowa ceased to make butter, the price of butter would boom. Is it not equally evident that the price of butter would take a great rise if the production and fraudulent sale of oleo were to cease?

WHY PAY A TAX OF 3 CENTS A POUND ON YOUR OWN BUTTER?

The best authorities estimate that the fraudulent sale and use of oleo reduces the price of butter at least 3 cents a pound, which virtually amounts to a tax of 3 cents per pound on the butter produced in this country. Why do we pay it? Because it has not been possible to arouse sufficient interest on the part of the producers of butter to demand and insist that laws be passed that will prevent the swindling of the people by the sale of oleo for butter. A tax of 3 cents a pound is a levy of 16 to 20 per cent, \$4.50 per cow, \$31.50 per patron of Iowa creameries, \$3,618 per creamery, or about \$500 more than the value of the creamery. Shall we continue to pay that tax, or, shall we insist that the next congress pass laws sufficiently strong to prevent the sale of oleo for anything but what it is? The above figures are none too large, for the butter made in Iowa creameries does not amount to more than half that made in the whole state.

COST OF MAKING A POUND OF OLEOMARGARINE.

About two years ago the New York state commissioner of agriculture prepared a careful estimate of the cost of making oleomargarine. He gives the actual total cost at 4.41 cents per pound, to which must be added the government tax of 2 cents per pound, making the total cost of the substitute for butter at 6.41 cents per pound. The stuff is sold for butter and at butter prices or near it. A dealer at Fort Madison, Iowa, was retailing oleomargarine at 17½ cents when butter was selling, best quality, for 20 cents. This oleomargarine was a butter yellow color and sold under the name of butterine. A profit of 11 cents per pound on an investment of 6.41 cents is a profit that is charming, or would be if the farmer enjoyed any of it.

THE ARGUMENT AGAINST OLEOMARGARINE.

Friends of the dairy interests have in the past made the mistake of devoting their attention to the unhealthfulness, uncleanness of oleomargarine, and its lack of nutritious qualities. All of their arguments are true, but do not touch the spot. Very few people eat oleomargarine knowingly, and users of butter care little about the defects of any substitute for butter so long as they do not use the substitute, or are deceived into thinking that they do not use it. It is a fact that when properly colored, salted, with artificial flavor given it by churning in sour milk, oleomargarine is a successful counterfeit of good butter, and

hence it is easy to deceive the consumer into thinking he is eating butter. What is the use of arguing that the stuff he eats is not clean, or unhealthful or adulterated with paraffine wax or coal tar dyes? The vulnerable point in the armor of the oleomargarine manufacturer is that he perpetrates a *fraud* and that his product is ultimately sold *fraudulently*. There is no fight being made on oleomargarine simply because it is designed to take the place of butter, but because it is sold as butter, because the consumer is not aware of what he is buying, because he is defrauded into buying something that he would not otherwise purchase, because he pays twice as much as the article is worth, because no one has a right to perpetrate a *fraud* on another. The oleomargarine manufacturer's cry of the poor man's butter is mighty flat when the stuff sells for butter prices.

YELLOW OLEOMARGARINE IS A FRAUD.

All efforts pointing toward the regulation of the sale of it have recognized the fact that people will not buy it if it has not the appearance of butter. No danger of any fraud by the sale of white oleomargarine. Butter is yellow and you can't make a man believe that a white, greasy compound is butter. It may be so flavored that his taste will be deceived, but if it is not yellow he knows it is not butter and refuses to pay butter prices for it, if he does not absolutely refuse it at any price at all. It is a fact that there is no sale for white butter in any market of the country and white oleomargarine is so little sought after that its manufacturer is practically unknown. The supreme court of the United States has held that oleomargarine is entitled to all the rights possessed by other articles of commerce, but has uniformly upheld those state laws which forbid the sale of yellow oleomargarine, on the ground that the police powers of a state are ample to prevent a fraud. But it is found that while the laws are all right from the standpoint of constitutionality, the enforcement of them is a practical impossibility, especially in large cities. The profit on the sale of yellow oleomargarine at butter prices is so great that the violator of the state law can afford to pay an occasional fine, and in the long run is successful in avoiding the officers whose duty and desire it is to successfully prosecute him. The internal revenue officers tell us that large quantities of the oleomargarine come into this state every year. The most strenuous efforts on the part of this department in the last year have succeeded in finding less than

a ton. If the laws we now have are not capable of successful enforcement in those states which have diligent officials, how much can be expected in those states where the officials are apparently friendly to the oleomargarine interests? What, then, shall we do?

THE 10-CENT TAX ON OLEOMARGARINE.

The National Dairy Union proposes to ask congress the following winter to pass a law taxing colored oleomargarine 10 cents per pound. The innocent consumer of oleomargarine now pays about that much more than it is worth, and as a matter of justice it seems to be the proper thing that the manufacturer should pay the amount and let the public treasury get the benefit of the tax paid. But, of course, the real intention is to make the substitute for butter cost something near what butter does, so that from a financial standpoint they will compete on equal terms. There will then be no 10-cent profit to be divided between the manufacturer and the retail dealer, and little inducement for either to violate the law by selling oleo as butter when they can sell *bona fide* butter at the same price and profit. The tax being collected at the place of manufacture, and a tax of 2 cents per pound being now collected, the machinery for the enforcement of the proposed law is already in operation and will need no increase.

The National Dairy Union is officered by the most prominent and well known supporters of dairy interests in the United States and is worthy of the greatest confidence. In this movement for the 10-cent tax on colored oleomargarine it has the support of practically all the dairy papers of influence, the dairy and food commissioners, and commissioners of agriculture of the different states, and all who are interested in the continued usefulness of the American cow and the sale of her best products. The proposed bill will doubtless have the votes of a large majority of both houses of the next congress, for thirty-three states with sixty-six out of ninety senators and 284 out of 356 representatives have already passed anti-color laws, and it can scarcely be possible that the congressmen from the states that are already on record as prohibiting the sale of yellow oleo will do other than vote to pass a law that will effectually control the sale of an illegal article in their states. If the proposed bill fails it will be because of the apathy of the butter producers of the country, and it is greatly to be desired that the farmers of the country and the butter-makers and handlers of

dairy products make it very plain to the congressmen who ask our votes, that they are expected not only to vote for the bill, but to actively support it. It would be a wise thing to do to prohibit the manufacture of oleomargarine altogether, as Canada does, but such a federal law would not be upheld by the courts, and it is useless to think of such stringent measures. But a tax so large as to bring the cost of oleo up to that of butter will take away all the inducement to make and sell it. And since uncolored oleo is not to be so taxed, there will still be opportunity for any one who wishes to eat the stuff to buy it and use it as he desires.

FACTS TO THINK ABOUT.

States having anti-color laws.....	33
States without anti-color laws.....	12
Licensed dealers in oleo.....	3,658
In anti-color states.....	2,800
In Illinois.....	1,083
In Iowa.....	1
Number of manufactories of oleomargarine in United States....	14
Permanent investment in same, say	\$1,500,000
They produce pounds of oleomargarine	87,000,000
Number of Iowa creameries and skim stations.....	954
Permanent investment in same	\$ 3,000,000
Cows tributary to Iowa creameries, investment in.....	25,000,000
Land, etc., say	25,000,000
Iowa creameries produce, pounds of butter.....	80,000,000

Remember that the creameries produce only one half the total butter of Iowa, and hence the above estimate on Iowa investment in dairy industry should be least at least doubled.

Remember that the oleo maker is restrained from increasing his output only by the market for it. He makes all he can sell, and he can double or treble or quadruple his product almost at will without increasing the expense per pound, or his investment. But the farmer, to make more butter, must have more cows and more land to keep them on. His investment must be greatly increased.

A FEW DONT'S.

Don't think the 10-cent tax "excessive." Prohibition of yellow oleo nargarine in this state is even more so.

Don't say, "We can't do it. It's too big an undertaking." Yellow oleomargarine is already an outlaw in thirty-three states representing four-fifths of the population.

Don't fear that a 10-cent tax will "legalize" oleomargarine. It is already taxed 2 cents per pound, and it is rather difficult to

see how an increase in the tax will change the status of the article taxed.

Don't forget that there is a tariff duty of 6 cents per pound on oleomargarine and an internal revenue tax of 15 cents per pound on all oleomargarine brought into the country and sold here. If oleomargarine needs protection from foreign competition to the extent of 21 cents, is it not reasonable for butter to ask for protection to the extent of 10 cents?

Don't fear that some new and unthought-of point will be sprung by the opposition that will defeat the measure and its effectiveness when passed. The matter has been fought out in a manner satisfactory to the legislatures, governors, and people of thirty-three states of this country, and the laws made in answer to public sentiment in these states containing the great majority of the population of the United States have been passed upon by the highest courts of the land.

The only question not now settled is, "Will the butter producers of the country demand the enactment of the proposed law by the next congress?" Would you stand quietly by and see a thief carry away your property? Write your congressman just what you want in the matter of the 10-cent tax and don't let congress be able to give as an excuse for not passing the bill, "Nobody is asking for it."

DAIRY FAKES.

THE TIN CAN SEPARATOR.

There are now upon the market and being advertised very extensively in a very few dairy papers and a good many farm papers, whose editors must certainly be aware of the facts, certain forms of tin can water dilution, so-called "separators," which are designed to separate the farmer from his money, and are reported to be a marvelous success in that particular. Only one of these machines has come close enough to this office so that the department was able to make any tests of the same, but the tests made gave results exactly in line with the results of those reached at the experiment stations of Iowa, Vermont, New York and Illinois. These machines are advertised to separate all the cream in from thirty minutes to an hour by the

simple process of mixing the milk with about an equal quantity of water, always of course, using the agent's particular form of tin can to do the mixing. In the few tests made by this office it was found that the best results obtained left in the skimmed milk more than one-fifth of the original fat content, to say nothing of the lessened value of the partially skimmed milk for feeding purposes because of its great dilution.

The publication of the above facts in a Des Moines newspaper drew upon this department a deluge of complaint from the sellers of the different forms of the tin can separator, and threats of damage suits for injuring the "business" of selling a 75-cent can, patented and painted red, to the farmer, for \$10 to \$15.

The process of separating cream from milk by pouring cold water into it is an old one and the scheme was condemned as far back as 1890 by the experiment station of Vermont. And on April 15, 1899, the same station issued a press bulletin from which the following is an extract. "Over one hundred trials show that there was left in the skim milk 13 per cent of the fat of mixed Jersey milk, 40 per cent of the fat of Ayrshire milk, and 17 per cent of the fat of stripper milk, mostly Jersey. The centrifugal separator left in the skim milk between 1 and 2 per cent only of the fat. The centrifugal separator, moreover, was able to extract cream from the diluted skim milk from the so-called 'separator.'

"These results speak for themselves. The cans are less efficient than centrifugal separators, less efficient than the best forms of deep setting apparatus, and no more efficient on the average than the old fashioned shallow pan."

The New York Experiment Station Bulletin 151, August, 1898, says: "In all probability they (the dilution separator) would give better results if used without dilution and immersed in as cold water as possible."

But the strongest evidence of all for Iowa people is a letter written by Professor McKay, professor of dairying at Ames, and published in the Chicago Produce of July 8, 1899. This is especially strong in view of the fact that one of the firms that is getting rich selling a water separator claims to have a letter from Professor McKay saying that their machine takes out more than 99 per cent of the butter fat. He says in reality what is contained in the following letter:

AMES, Iowa, June 14, 1899.

Mr. S. J. Fairfield, Cherokee, Iowa:

DEAR SIR—In answer to your letter would say that I consider the hydraulic separator to be one of the biggest frauds that has been placed before the dairy men for some time.

In our experiment here with it, we found it left in the milk nearly 1 per cent of fat, and in some cases more, or in other words it left one pound of butter to every one hundred pounds of milk. Experiments were conducted at Cornell, also at the station in Vermont, where same results were obtained.

We have had as good results when using just a common milk can and pouring cold water in with the milk, thus causing a separation of the fat.

This skim milk is not as good for the calves as ordinary skim milk, as they have to drink twice as much as of ordinary skim milk to obtain the same amount of solids. Yours respectfully, G. L. MCKAY.

Cream raised by the dilution method will average something like 15 per cent butter fat instead of 30 or more per cent found in separator cream. People of experience in churning understand easily that such low testing cream is hard to churn and the loss of fat in the buttermilk is large.

The fact is that the dilution method of creaming is a quick, but wasteful method of separating part of the cream from the milk, with the additional disadvantage that the skimmed milk is diluted very much. And even if a person chooses to use the method of dilution, he does not need to buy a painted and patented can at the agent's price to do so; for he may use a common shotgun can, or have a tinner put a concave bottom and a faucet in a common can, and pour in water at the top to his heart's content, knowing that he is getting just as much of the cream as is his neighbor who paid the price asked, under the impression that he was getting a very valuable and scarce article. The only possible advantage of the water method is that the cream obtained, being only a couple of hours old, is sweet. But since cream must sour to a degree before butter-making, the loss of the cream in the diluted skim milk is in no way compensated for by the sweetness of the cream.

The reason why the cream is not all separated by this method when a major part of it does so separate in a short time, lies in the fact that the globules of butter fat are not of the same size. In ordinary deep setting in cold water not all of the cream is obtained, and it is well known that a part of the cream that is obtained comes to the top only at the end of twenty-four or thirty-six hours. That is to say, it is a well known fact that the large globules of fat raise quickly and the

small ones do not. In Jersey and Guernsey milk the globules are of large size and quite uniform; while in Holstein milk they are small and vary in relative size, and such is the case in milk from other breeds. The dilution of milk with cold water cools the milk very rapidly, but because the butter fat globules have a different rate of conduction of heat than the other parts, the natural difference in specific gravity is increased and the larger globules come to the top rapidly. But the smaller ones, not rising so soon, have time to become as cold as the mixture in which they float, and do not come up at all, or if at all, at the end of a much longer period of time than they would have taken naturally. Now, here is the agent's strong point. He sets away some of the diluted skimmed milk, refers to the fact that new milk, such as he has in his skimmed milk, will show cream in a very short time, and at the end of six or eight hours calls attention to the fact that there is no cream on his partially skimmed milk, and, therefore, his machine has separated all the butter fat from the milk. But the Babcock test will invariably show something like 1 per cent of butter fat, or about one-fourth of the original content of fat.

If your patrons are approached by agents for such machines, protect them by applying the Babcock test, using for the diluted skimmed milk about a third more acid than for whole milk, and you will have no trouble in convincing them that they have no need of any such method.

Do not let your patrons be imposed upon by agents of the rival concerns. There are a number of them going the rounds demanding royalty because of infringement of patent. That part of the thing is a swindle indeed. The patents, if any, apply to the particular form of the can and not to the process. There can be no patent on the process of diluting milk with water, though there may be as many patents on different forms of cans as there are different individuals desirous of getting a stiff price for a useless article. The scheme of scaring a man into paying royalty, because of infringement of patent, was worked out years ago, and your patrons will be safe in paying no attention to the demands of the agents aforesaid.

A late issue of Hoard's Dairyman says editorially:

The Wheeler Separator company, of Syracuse, N. Y., is demanding a royalty from dairymen of New York who are using the dilution method of separating cream, claiming that they have a patent on the process. Seeing that every experiment station and dairy authority in the country hav

condemned the process and cans as useless and wasteful, it is strange that so many dairymen still bite at this fake and submit to be buncoed into paying a royalty for using a process that is not and cannot be patented. Verily, a fool and his money are soon parted.

BUTTER INCREASERS.

Another scheme is the sale of so-called butter increasers. The chemists tell us that there are a number of chemicals which, by proper manipulation, will increase the weight of butter. The facts are these: A certain weight of butter melted and churned with an equal weight of milk, together with a portion of the "increaser," will be greatly increased by the process, because of the increased amount of water retained in the butter. Naturally butter will contain about 12 or 15 per cent of water. By the use of the "increaser" it may be made to contain 50 or more per cent of water; that is, two pounds of butter can be made from one. But unfortunately for the user of this new wonder, the butter is of such consistency that it deceives no one and is unsalable at butter prices. This office received a sample last winter that contained 59 per cent of water, but the commission man to whom it was originally shipped was obliged to sell it for 3 cents per pound, and then it was returned to him as of no value whatever. This butter increaser, by whatever name, is one of the things that are made to "sell," not to use or to serve any purpose at all. But the cheap chemical is sold at a high price to the ignorant person who hopes to get rich selling water at butter prices. It is the opinion of this department that the law defining imitation butter and specifying penalties for the manufacture of it in Iowa will apply to such a compound. Section 2516: Every article, substitute or compound, save that produced from pure milk or cream from milk of cows, made in the semblance of, or designed to be used for and in the place of butter, is imitation butter. The penalty for violating any of the provisions of the law is "not exceeding \$500 or six months in jail."

THE THREE-MINUTE CHURN.

This much advertised machine consists of a box which has inside of it apparatus for setting up a more or less cyclonic motion, with the result that the butter "comes" in a very short time, but it is a sort of cross between whipped cream and butter, contains an excess of curd, the loss of fat in the butter milk is very great, whereas it should be little or nothing.

Beware of labor-saving inventions that are said to save *all* the labor.

PRESERVATIVES IN MILK SOLD TO CREAMERIES.

Several complaints have come to this office from creameries in different parts of the state in regard to the use of preservatives by the patrons of the creamery. We have invariably replied that such use of preservatives in milk is a very plain violation of the law, and have advised that the offending patron be fined in the nearest justice's court. The use of the preservative is a confession on the part of the user of it that his milk is not properly handled, that it is more or less filthy, and that he is obliged to embalm it to make it keep twelve hours. Insist that your patrons bring you clean, sweet, pure milk. It is for your interest to do so, but vastly more to their interest that the creamery be able to make a good article of butter. The preservative will keep the milk sweet, and it will delay the ripening of the cream from such milk, and the cream will be unevenly ripened and the fat lost in the buttermilk. Neither the creamery nor the patron can afford such loss. It is possible for milk to be kept thirty-six hours in a good condition if it is properly handled. The cans must be made clean by washing and scalding, the milk must be handled in a cleanly manner and cooled to a temperature of 50 degrees or less as soon as drawn.

The preservatives in use are more or less poisonous. There are several kinds of preservatives now advertised extensively and there seems to be an epidemic of the use of them. The basis of most of them is either boracic acid or formaldehyde. The latter of these is, in strong solution, used for disinfecting or embalming purposes. It is sold under the names of "Freezine," "Liquid Milk Sweet," and other catchy titles, but it is the same old poison all the time. It is worth about 4 or 5 cents a quart and is sold under the trade name for about \$1 a quart. These preservatives are sold on the pretense that they are harmless, that they improve the digestion, and that they cannot be detected by chemical analysis. All of these claims are false, as certain milk men in Iowa have found to their sorrow. But the Iowa law absolutely forbids the use of these or any other adulterations of milk. "The addition of water, or any other substance or thing, to whole milk, or skimmed milk, or partially skimmed milk, is hereby declared an adulteration."—Section 4990. The fine for selling adulterated milk is

from \$25 to \$100 and the person upon whom the fraud is committed can collect double damages from the one who so defrauds him. The legal aspect of the use of milk preservatives is more fully discussed in the part of this report devoted to matters pertaining to the city milk inspection.

STANDARD BOTTLES AND PIPETTES.

Despite the fact that this department has three times sent circulars to all the creameries of the state, there still remains a great amount of ignorance on the part of some creamery managers in regard to the law relating to standard bottles and pipettes. The law provides a means of showing to your patrons that your glassware and testers are accurate and reliable. Not only that, but the law requires that each creamery shall have the D. C. standard bottles and pipettes. And the burden of proof, in any action relating to the testing of milk, is upon the operator of the test to show that his test is accurate. Several creameries have complained to this department of having received watered milk, and we have been obliged in nearly every case to point out to the complainant the incongruity of asking this department to prosecute a farmer for bringing watered milk to a creamery that did not comply with a plain command of the law relating to the accuracy of the very test which was the foundation of the complaint. No court would convict a man for selling adulterated or watered milk, if it could be shown that the operator of the test had not complied with a very easy requirement of the law looking toward accuracy of his test. In fact, it would be easy to show that the operator of the test did not know whether his glassware was accurate or not, and the law lays upon him the burden of proving that the bottles and pipettes used are accurate. Hence, we have declined to enter into suits that could only result in acquittals under any circumstances.

Accuracy of test is just as important to the creamery man as it is to the farmer, for unless that farmer is satisfied with his test, he will find some way to change the matter, and in the long run the creamery man will lose by the faults of his testing. It may be that the farmer will lose also, but that will not be any satisfaction to the creamery man whose creamery is closed

“for lack of patronage.” Inaccuracy in the testing of milk is equivalent to dishonesty. Read the law.

SEC. 2515. He [the dairy commissioner] shall keep on hand a supply of standard test tubes or bottles and milk measures or pipettes adapted for use by each milk testing machine, the manufacturers or dealers of which have filed with the dairy commissioner a certificate from the director of the Iowa agricultural experiment station, which shall certify that said milk testing machine, when properly and correctly operated, will produce accurate measurements of butter fat, and furnish to any person or corporation desiring the same for testing milk one such tube or bottle, and such milk measure or pipette for each factory, of the kind adapted for the machine operated therein, upon request therefor, certifying it to be accurate, reliable and standard, placing thereon the letters “D. C.” as a permanent mark; the tubes or bottles and pipettes to be furnished at the actual cost thereof.

SEC. 2523. *Milk test.*—Any person or corporation, or the employe of such person or corporation, who operates a creamery or cheese or condensed milk factory, and uses a chemical milk test to determine the quantity of butter fat in milk purchased, used or received, shall so use only such tests as shall be clear oil, free from any foreign substance, and produce correct measurements of butter fat, and every such person or corporation using a milk test shall procure from the dairy commissioner for each factory so operated one standard tube or bottle, and one standard measure or pipette, for testing milk, certified and marked by him as in this chapter provided, which shall be kept for inspection by the patrons and used by such person or corporation in testing or verifying test tubes or bottles and milk measures or pipettes used. In any action arising between any such operator and patron, the burden of establishing the use of reliable tests and the results therefrom, equivalent to the standard herein provided, shall be upon the operator.

Have you complied with the above law?

Below will be found a list of the milk testers that have been certified to this office by the Iowa agricultural experiment station, and for which standard bottles and pipettes will be furnished. The price of the bottle is 50 cents; the pipette is 25 cents. This department will also furnish a correctly calibrated cream pipette, one-third size, for 25 cents.

STEAM MACHINES.

Cornish, Curtis & Green. Curtis Babcock, 20, 24 and 30 bottles.

F. B. Fargo & Co. Fargo's New 40 Bottle.

Elgin Manufacturing Co. Standard, Nos. 1, 2, 3 and 4; Russian No. 1, 12 bottles; No. 2, 24 bottles.

Creamery Package Manufacturing Co. Ideal Turbine, 20, 24, 32 and 40 bottles; Cushman Turbine Tester, 24 to 40 bottles.

Haney-Campbell Co. Superior, 24 bottles; Haney Tin Tester, 20 bottles; Haney's Turbine Tin, 12, 16, 24 and 30 bottles.

A. H. Barber & Co. Dr. Babcock's Milk Tester, 20, 24, 30, 36 and 40 bottles; Omega, 24 bottles.

D. H. Burrell. Facile, iron frame, 24 bottles.

Vermont Farm Machine Co. Doctor Babcock's 20 bottles.

HAND MACHINES.

Creamery Package Manufacturing Co. Roe Pattern, 4, 8, 12 and 24 bottles.

Elgin Manufacturing Co. No Tin Babcock, 6 bottles.

Cornish, Curtis & Green. Curtis Babcock, 4, 6, 8, 10, 15 and 20 bottles.

D. H. Burrell. Facile, 6, 8 and 10 bottles.

MILK TESTING.

The separator and the Babcock test have done more for modern dairying than all other agencies combined. But there is no one thing just now that causes more trouble between the patron and the butter-maker or manager than dissatisfaction with the test. Aside from a few cases of plain dishonesty in testing, this dissatisfaction arises from two causes, both under the control of the creamery manager. The farmer is, in a large majority of cases, absolutely ignorant of the manner of testing or its possible accuracy, or the things that affect the test. He cannot be made to believe that the test of his cows will be less than that of his neighbors' on the same feed. His lack of faith is founded on a lack of knowledge, but it injures the creamery business just the same as though his lack of faith were founded on the actual dishonesty of the creamery man. It would be wise to have the matter of the test thoroughly explained at every farmers' institute in the country and at every like gathering. When the patrons of the creamery come to know all about the test, they will be less dissatisfied and more able to tell the dishonest manager from the fellow who knows his business and does the testing and the recording of the same properly. The second cause of dissatisfaction lies in the ignorance and carelessness of the man who makes the test. When a butter-maker reports that the number of his D. C. test bottle is 176cc and that his tester makes 6,000 revolutions per minute, it is evident that if he has any knowledge of milk testing he has carefully concealed it. When a butter-maker writes that the test shows the amount of butter to be made from the milk, and that there is no overrun, it is plain that his ignorance is monumental.

This department has tested a large number of samples of milk from various sources during the past year, with various results. In general, tests made by this department were higher than the tests of the creamery. One man brought in quite a number of samples and said his patrons were watering their milk. His tests had averaged about 2.6, and the tests made here averaged about 3.4. His bottles were filthy with accumulated dirt and mold, chunks of mold floated in his samples, and he was curious to know why we heated the samples before taking the sample. It seems as though a good many operators of the test prefer to have the farmer think the test is manipulated dishonestly rather than take a little pains to have it right and appear right.

The greatest source of error is in mixing the sample before taking the milk into the pipette. The composite sample invariably has a portion of cream upon it, and no amount of shaking will make it mix with the milk. It must be heated to make the cream melt down sufficiently to mix properly. Then it must be cooled to 60 degrees, the proper temperature for the mixture with the acid. All of this takes time and labor, but the conscientious butter-maker will give just such effort, and he will have a successful creamery and a satisfied patronage. He ought to have good wages, also, but the chances are he will have to compete for his place with some cheaper man, who knows all about milk testing but will do it in a hurry and with little effort, on the theory that the success of the creamery depends mainly upon the price at which his butter sells. The creamery business cannot run without the farmer, and Iowa is the graveyard of numerous creameries, "closed for want of patronage."

It is just as bad morally, and has the same bad effect on the creamery industry, for an operator to carelessly and inaccurately make his tests, as it is for the dishonest man to scale the test for the purpose of taking the difference out of the producer. The creamery men of Iowa can afford to put a good deal of effort into some plan of educating the farmer in regard to the test, and a little greater care to see that he gets an accurate test every time. The errors of testing are all towards a reduction of the test. You cannot get more butter fat out of the milk than there is in it, and if you make any mistake the farmer is the loser. But the creamery man cannot afford to

let the producer lose too often, or he will find himself where a great many others now are, "without patrons."

If sour milk is to be tested, a few drops of ammonia may be used to dissolve it so that it will enter the pipette. Or it may even be necessary to use equal quantities of ammonia and milk, correcting the test for the amount of ammonia added. Any such method is manifestly inaccurate, and is given here only as a suggestion for use when better methods cannot be used.

TESTING CREAM.

The large and steadily increasing number of farm separators now in use leads naturally to a study of cream testing. Cream from the farm separators will obviously be bought by the creameries by the test, and in any case the farmer will insist that the cream be bought and paid for according to its amount of butter fat. But practically all the creameries will continue to buy milk to be separated at the factory. Hence there will be necessary some adjustment as to the exact manner of payment for the fat in the cream as compared with an equal amount of fat in the whole milk. The creamery pays for all the fat in the milk, but does not get it all out. If milk testing 4 per cent is purchased and the separator leaves in the skimmed milk one-tenth of one per cent or more, the creamery pays for that amount which it does not get. The amount left in the skimmed milk is from $2\frac{1}{2}$ to 5 per cent of the amount paid for. There is, of course, no such loss in the case of cream brought to the creamery; neither is there any expense of separation of such cream and the fat in the cream is worth more per pound than the same amount of fat in the whole milk.

But all the present objections to the Babcock test, and suspicions of its accuracy, will be increased in cream testing, for the reason of the increased richness of the same. Hence there is greater need of carefulness in cream testing than in testing of milk.

The method in use under the direction of this office in the city milk inspection, requires the use of a pipette one-third size in connection with the ordinary whole milk bottles. The process is as follows: Using the one-third size pipette, take one pipette of cream and follow with two pipettes of water; use about two-thirds the usual amount of acid because there is a smaller quantity of curd to be dissolved than there is in milk; complete the tests as you would for milk and multiply the read-

ing of the fat by three, because the amount of cream taken is only one-third as much as the amount for which the scale is written. If the cream is very rich, testing more than 80 per cent, mix equal quantities of the cream and water, proceed as before and multiply by six. If the fat column is milky or has milky specks in it, the acid is too weak or too small in quantity; if the fat column has black specks in it the acid is too strong or too much in amount. The fat in all tests should show a clear golden yellow color.

The advantages of this method over that of using the usual cream bottles are numerous. The cost is entirely limited to the price of the pipette, which is sold for about a quarter of a dollar. It gives more accurate results than the cream bottle method, for two reasons: there is no cream left sticking to the pipette, for it is washed out by the two pipettes of water that follow the cream; and the divisions of the scale on the whole milk bottles being so much larger than those on the cream bottles, the reading, with proper care, is more nearly correct. But on the other hand, any error is multiplied by three.

The possible or probable errors in cream testing are rather more than in milk testing. Sometimes the cream will reach the creamery too sour and lumpy. It will be necessary in such case to heat the cream to about 170 degrees and stir it thoroughly until it is smooth and uniform. It may be necessary to add a few drops of strong ammonia, but the cream must be smooth in order to get a fair sample of it. Too much care can not be exercised in taking the sample. About a teaspoonful is to be tested to show the value of a number of gallons of cream, and it is only fair to the seller that great care be taken to have the tests as accurate as possible. Then, again, the pipette, whatever its size, will not always deliver the same weight of cream, for cream varies in weight in proportion to its richness of butter fat. The 17.6 cubic centimeter pipette is intended to deliver 18 grams of milk, and will do so with practical uniformity, because milk varies only a very little in weight. But with 10 per cent cream it will deliver 17.9 grams, and with 50 per cent cream it will deliver but 15.8 grams of cream. All the numbers used in the testing of milk and cream are weights, except the number 17.6 cubic centimeters, which is the capacity of the pipette intended to hold 18 grams of milk.

Absolutely accurate cream testing can only be done by weighing the cream. If facilities are at hand for weighing

the cream, about 5 or 6 grams of cream should be weighed into an ordinary bottle, followed by twice the same volume of water and two-thirds the usual amount of acid. When the test is complete multiply by 18 and divide by the weight in grams of the cream used. But the method of weighing the cream, while much more accurate than any other, is of course not so practicable as the one first mentioned herein, because of lack of means to get the correct weights.

It will be seen that whatever the manner of measuring the cream the possible errors are all in the direction of too small a test, and so the reading of the fat should be liberal. It should be from the top of the column to the bottom. Too much care cannot be exercised by the one doing the testing. It will pay you to study all the books on milk and cream testing you can secure. If you can persuade your patrons that you are giving them a fair deal in the matter of testing you will have that many friends, otherwise that many enemies.

WHAT IT COSTS TO MAKE A POUND OF BUTTER.

The reports in answer to the question, "What is the cost of making a pound of butter, including all expenses except hauling milk, freight and expenses," vary greatly, even with creameries of about the same capacity. This is not unexpected, for some expenditures, such as insurance for a term of years, permanent repairs or minor improvements, new machinery or other unusual expenses might increase the apparent cost quite a good deal over that in a creamery which had none of these items this year, but may have them next. Hence, all of the replies, which did not show on the face of them a misunderstanding of the query, have been tabulated and the result given in the following table.

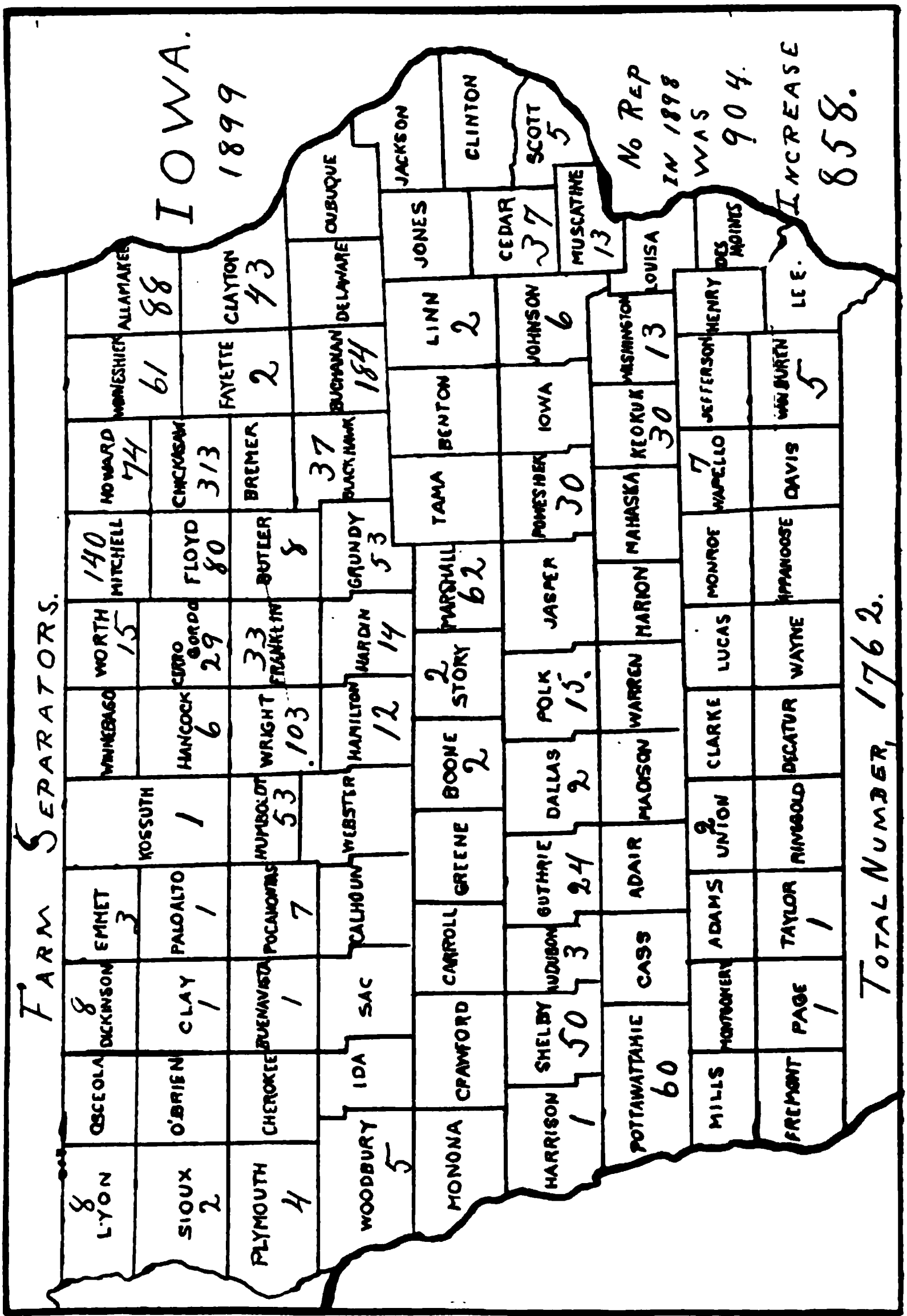
The average creamery of the state makes about 110,000 pounds of butter in a year, and the following table shows that the cost of making approximated 2 cents per pound. The cost of tubs and butter-makers' wages will probably be about \$1,100, which would leave another \$1,100 for other expenses, and this seems to be a not unreasonable expense. Naturally the expense of making butter decreases greatly as the amount of butter made increases

Reports from gathered cream creameries were very few in number and hence of little value:

DESCRIPTION OF CREAMERIES.		Number re- porting	Cost—cents.
In creameries making not more than 50,000 pounds of butter.....		20	2.05
In creameries making between 50,000 and 100,000 pounds of butter.....		45	2.06
In creameries making between 100,000 and 150,000 pounds of butter.....		23	1.86
In creameries making between 150,000 and 200,000 pounds of butter.....		28	1.79
In creameries making between 200,000 and 300,000 pounds of butter.....		11	1.50

SHOWING AVERAGE MONTHLY PRICE OF FANCY WESTERN CREAMERY BUTTER IN NEW YORK MARKET.

MONTH.	Twelve months ending Nov. 1, 1892.	Twelve months ending Nov. 1, 1893.	Twelve months ending Nov. 1, 1894.	Twelve months ending Nov. 1, 1895.	Twelve months ending Nov. 1, 1896.	Twelve months ending Nov. 1, 1897.	Twelve months ending Nov. 1, 1898.	Twelve months ending Nov. 1, 1899.
November.....	\$. 2590	\$. 3100	\$. 2790	\$. 2310	\$. 2330	\$. 2112	\$. 2225	\$. 2337
December.....	.2887	.3112	.2840	.2440	.2500	.2250	.2290	.2160
January.....	.3075	.3287	.2562	.2519	.2266	.1900	.2040	.1975
February.....	.2975	.2875	.2700	.2394	.2000	.2050	.2042	.2100
March.....	.2665	.2925	.2250	.2670	.2185	.1900	.1937	.2075
April.....	.2869	.3112	.2287	.2000	.1650	.1890	.1990	.1942
May.....	.2125	.2455	.1700	.1785	.1672	.1590	.1590	.1790
June.....	.1944	.2181	.1831	.1794	.1550	.1500	.1687	.1881
July.....	.2310	.2160	.1950	.1770	.1505	.1500	.1687	.1835
August.....	.2220	.2300	.2360	.1980	.1571	.1675	.1860	.2000
September.....	.2525	.2750	.2 00	.2125	.1600	.1930	.2025	.2262
October.....	.2687	.2941	.2540	.2304	.1850	.2290	.2235	.2400
A v. val. per lb. for each yr.	\$. 2594	\$. 2776	\$. 2350	\$. 2190	\$. 1892	\$. 1895	\$. 1971	\$. 2065



FARM SEPARATORS.

COUNTIES.	No. separators reported.	DO THEY INCREASE?			COUNTIES.	No. separators reported.	DO THEY INCREASE?	
		Yes.	No.				Yes.	No.
The state.....	1783	100	30			1783	100	30
Allamakee.....	88	0	2	K		1	1	1
Andubon.....	33	0	1	L		1	1	1
Black Hawk.....	37	2	1	L		1	1	1
Boone.....	181	0	1	L		1	1	1
Buchanan.....	11	1	1	L		1	1	1
Buena Vista.....	1	1	1	L		1	1	1
Butler.....	1	1	1	L		1	1	1
Cedar.....	57	1	1	L		1	1	1
Cerro Gordo.....	39	1	1	L		1	1	1
Chickasaw.....	213	1	1	L		1	1	1
Clay.....	1	1	1	L		1	1	1
Clayton.....	43	7	1	L		1	1	1
Dallas.....	1	1	1	L		1	1	1
Dickinson.....	33	1	1	L		1	1	1
Emmet.....	1	1	1	L		1	1	1
Fayette.....	1	1	1	L		1	1	1
Floyd.....	30	3	1	L		1	1	1
Franklin.....	38	3	1	L		1	1	1
Grundy.....	58	4	1	L		1	1	1
Guthrie.....	24	1	1	L		1	1	1
Hamilton.....	13	3	2	L		1	1	1
Hancock.....	6	1	2	L		1	1	1
Hardin.....	14	3	1	L		1	1	1
Harrison.....	1	1	1	L		1	1	1
Howard.....	74	1	1	L		1	1	1
Humboldt.....	55	6	1	L		1	1	1
Johnson.....	6	1	1	L		1	1	1
Keokuk.....	30	1	1	L		1	1	1
					The state.....	1783	100	30

FARM SEPARATORS.

The great increase in the use of farm separators is easily noticeable from the preceding table. Despite the expense connected therewith their use bids fair to become more or less general in the dairy portions of the state, and while their introduction may not be looked upon with favor by all creamery men, it will be necessary to adjust ourselves to the new conditions. The creamery can only exist when the farmer is making some money out of his dairy, and if he sees that he can make more money with the same or less work by skimming his milk at home he will do so. And in the end the creamery will be benefited by the increased interest in dairy matters and the increase in the product thereof sent to the creamery to be worked up and sold.

The advantages of the farm separator are:

Effectiveness of skimming over any method of gravity creaming.

Saving in cost of hauling milk to creamery and back.

Increased value of the skimmed milk, due to its uniform sweetness.

Saving of time, labor, and dairy utensils formerly in use.

The disadvantages are:

The expense.

The labor of running the separator.

Despite the fact that there are many separator creameries in Iowa, there is still a great number of large dairies, and innumerable smaller ones, that still pursue the old wasteful methods of gravity creaming. To these, where the dairy is large enough to warrant the expense, the hand separator comes as a money-making machine without a doubt. The best methods of gravity creaming, using ice, leave in the milk from six to nine-tenths of one per cent of fat, while the best separators will take out practically all of the fat, and give a better quality of cream. Such a saving of one-seventh or one-sixth of the total fat content of the milk is certainly desirable. It seems to be a self-evident proposition that the use of the farm separator will soon become the regular thing in connection with gathered cream factories.

The dairyman who sends his whole milk to the creamery, pays, on the average, either in money or his own time and labor, about 9 or 10 cents per hundred pounds for the hauling. A large part of this will be saved if he sends only the cream. The average price for milk the state over for the year will approximate 66 cents per hundred, of which the price paid for hauling is about one-seventh, or an amount equivalent to what the gravity creamer loses in defective skimming. In both cases the skimmed milk will have a greatly increased value if separated while warm and fed. The skimmed milk contains all the elements that go to form bone, hair, muscle and nerve, and lacks only those elements which go to form fat or to keep up the heat of the body. But the gravity skimmed milk is thirty-six hours old and sour before fed; and the creamery milk is sweet one day and sour the next, and the calf fed upon it is likely to be afflicted with diseases of his digestive organs, culminating in scours. At the best he will not do well on such a diet. The farm separator enables the farmer to feed his milk within an hour after it is drawn from the cow, and the calves or pigs get absolutely all there is in the milk, and in its natural state except the cream taken out of it. The uniformity

of such milk will be greatly appreciated by the calf, and he will show it by increased growth and vigor.

The saving in time and labor in the use of the separator is considerable. Especially is this true if the farmer has some sort of power with which to run the machine. He can then have his milk separated almost by the time he has the milking done and no dairy utensils to wash, except the separator and the milk pails, no large quantity of milk to take care of and keep cool, no fear that it will be tainted by bad odors, and no expense of ice, or time or attention to the pumping of the proper amount of water to keep the milk sweet. But the time spent in turning the separator by hand is a different matter. A tread power is a small additional investment and the value of it is very great, for it can be made to take the place of a man a couple of hours every day and seems to be an almost indispensable adjunct to the separator on a large dairy farm.

When milk is run through a separator immediately after milking, the cream has an added quality over that which is skimmed at the end of twelve or more hours. The separator is the best aerator of milk yet invented. Large city dairymen run their milk through separators in order to aerate it and take out the odors that may be therein, and they find that the milk with the cream put back into it is of much better quality and keeps better than that which has not been so treated. The use of the farm separator tends towards better butter, and hence higher prices for it.

Of course every farmer must determine for himself whether the conditions on his farm will warrant the expense of a separator and power. Assuming that dairymen are in the business for the money there is in it, and not exclusively for the pleasure of the society of the cow, it is evident that the question is one of dollars and cents. The dairy authorities all estimate that a man can afford to have a separator if he is in the business to the extent of 10 cows or more. And it may be well to state here that experience shows that it is cheaper in the long run to buy the larger-sized machines. It is usually found that if a man gets something for nothing that it is worth about that price. A great many have discovered that they have a desire to keep more cows and cannot do so without buying a larger machine. The tendency of the use of the farm separator is toward expansion in the dairy herd.

But there is another feature of the use of the separator on the farm that will cause the creamery man grief, and loss to the farmer. The large dairymen will possibly get the idea that they can do better by making butter at home if they have the cream already separated. It should be remembered by them that the operating of a separator requires no particular skill, but that the making of butter requires the greatest of skill and experience, and the marketing of butter in Chicago or New York is not so simple a matter as selling a load of hogs to the local dealer.

Then, too, there is a prejudice existing against dairy butter, and the price for the same, except in a strictly local retail market, will probably be less than for an equal quality of butter that has a creamery brand upon it. Except in those cases where a farmer can work up a trade for his butter in some near by town or city, it will be found more profitable for him to send his milk or cream to the creamery than to make it into butter at home and market his own product.

It is not to be expected that the use of the farm separator will become universal and so crowd out the separator creameries, but only that the larger dairies will take advantage of its usefulness, and that the smaller producers will still continue the present system, and the natural growth of the industry all over the state will support all the creameries we now have, and in a few years will support twice as many as at present.

STATE DAIRY COMMISSIONER.

49

TABLE No. 1.

NUMBER OF COWS AND PATRONS.				
Av. number patrons per creamery.	No. creameries reporting.	Av. No. cows per creamery.	Total patrons of creamery in county.	Total number of cows in county.
116	356	804	90,243	625,512
210	2	943	1,080	4,710
500	...	...	1,000	...
217	3	1,119	1,738	9,723
113	2	729	1,017	6,294
56	2	325	605	2,375
86	10	968	1,634	13,877
122	5	825	854	5,775
38	14	700	1,000	13,000
141	6	990	2,345	15,840
133	3	1,300	1,197	10,800
107	14	735	2,347	15,385
107	2	650	423	2,000
86	7	591	968	6,534
168	2	1,143	1,175	8,001
86	2	300	335	6,400
110	1	450	770	3,150
180	11	1,022	3,600	11,100
247	2	723	494	1,494
70	4	512	330	4,908
131	11	1,047	2,420	20,940
27	2	290	111	570
123	1	200	728	1,144
100	1	200	200	900
70	14	711	1,930	12,908
104	2	1,082	415	4,112
96	14	576	1,373	12,573
71	1	850	422	3,300
124	13	1,000	2,604	11,111
131	4	575	947	4,025
133	5	1,276	1,188	10,584
115	2	425	805	2,175
83	10	625	864	3,935
240	...	...	1,440	...
123	6	334	1,353	10,274
70	7	64	630	5,481
134	6	1,125	1,474	12,485
161	2	630	644	2,520
70	2	275	140	...
136	2	1,466	1,468	11,723
84	4	112	840	7,120
76	2	750	375	3,750
250	...	...	1,750	...
125	4	723	1,512	1,111
125	...	...	1,000	...
114	5	663	634	3,975
78	...	...	290	...
116	9	489	2,126	3,808
223	2	615	864	1,845
84	14	527	1,700	17,307
91	6	576	2,174	15,684
116	2	650	343	1,969
60	1	600	80	600
92	1	500	330	2,300
75	2	275	150	750

TABLE No. 1—CONTINUED.

COUNTIES.	AV. VALUES OF CREAMERIES AND SKIM STATIONS.						NUMBER OF COWS AND PATRONS.					
	No. of cream-eries.	No. reported.	Average value.	No. of skim stations.	No. reported.	Average value.	No. creameries reporting.	Av. number patrons per creamery.	No. creameries reporting.	Av. No. cows per creamery.	Tot. patrons of creamery in county.	Total number of cows in county.
Mahaska	1	1	10,000	1	1	10,000	1	400	1	2,000	400	2,000
Marion.....	2	2	2,000	1	1	2,000	1	100	1	1,000	100	1,000
Marshall.....	6	4	2,375	6	4	2,375	4	164	2	900	988	5,400
Mills.....	2	2	2,000	1	1	2,000	1	100	1	1,000	100	1,000
Mitchell.....	10	8	2,225	10	8	2,225	7	247	3	1,671	2,470	16,710
Monona.....	1	1	4,000	1	1	4,000	1	100	1	1,000	100	1,000
Monroe.....	1	1	2,000	1	1	2,000	1	100	1	1,000	100	1,000
Montgomery.....	1	1	2,000	1	1	2,000	1	100	1	1,000	100	1,000
Muscatine.....	4	3	2,167	1	1	2,167	3	241	2	1,202	964	5,168
O'Brien.....	6	5	2,920	1	1	2,920	4	55	2	550	330	2,300
Osceola.....	2	2	2,000	1	1	2,000	1	100	1	1,000	100	1,000
Page.....	6	5	2,640	1	2	1,500	3	58	1	650	336	2,900
Palo Alto.....	17	17	2,982	1	1	2,000	16	87	11	895	1,479	15,215
Plymouth.....	11	10	2,200	1	1	2,000	7	87	5	576	957	6,336
Pocahontas.....	9	6	2,600	4	2	1,000	6	92	1	900	837	8,100
Polk.....	5	2	2,500	2	2	1,500	3	278	1	1,000	1,300	1,300
Pottawattamie.....	6	5	2,900	1	1	2,000	5	149	4	1,100	894	6,600
Poweshiek.....	7	4	2,750	1	1	2,000	3	188	1	1,200	1,216	8,400
Ringgold.....	2	2	2,000	1	1	2,000	1	80	1	500	180	1,000
Sac.....	14	8	2,025	1	1	2,000	8	76	4	872	1,084	5,908
Scott.....	2	2	2,000	1	1	2,000	2	72	2	560	216	1,740
Shelby.....	8	7	2,000	1	1	2,000	6	118	4	706	944	5,648
Sioux.....	8	8	2,875	2	2	1,000	7	90	6	510	720	4,080
Story.....	15	12	2,258	1	1	2,000	10	123	9	897	2,085	12,455
Tama.....	7	5	2,740	4	1	1,200	4	172	3	808	1,638	4,848
Taylor.....	5	2	2,750	1	1	2,000	2	107	1	600	535	2,000
Union.....	5	5	4,800	9	12	1,420	4	319	2	1,570	1,595	7,850
Van Buren.....	4	3	2,166	1	1	2,000	3	190	2	703	780	2,800
Wapello.....	4	3	2,500	1	1	2,000	1	40	1	150	160	600
Warren.....	3	2	2,750	2	2	1,700	2	140	2	550	420	1,650
Washington.....	6	6	2,766	1	1	2,000	2	231	2	440	1,336	2,640
Wayne.....	3	2	4,000	3	3	2,000	1	300	1	1,000	900	900
Webster.....	10	8	2,187	2	1	1,000	5	118	2	600	1,180	6,000
Winnebago.....	7	5	2,200	3	7	1,457	6	115	4	894	805	6,356
Winnebush.....	12	11	2,655	1	1	2,000	11	142	5	837	1,846	10,881
Woodbury.....	7	6	2,080	1	1	2,000	4	120	1	800	840	5,600
Worth.....	10	8	2,068	1	1	1,000	9	107	7	722	1,070	7,220
Wright.....	10	9	2,800	2	1	1,200	6	112	7	764	1,120	7,640
The state.....	779	619	\$ 2,145	188	101	\$ 1,494	552	116	256	804	90,248	625,512

COMPARISONS.

	1898.	1899.
Number of creameries.....	798	779
Number of skim stations....	161	188
Number of cheese factories.....	67	69
Total number of plants	1,026	1,036
Average value of creameries.....	\$ 2,034	\$ 2,145
Average value of skim stations	1,510	1,494
Total value of creameries.....	2,398,269	2,449,855
Total value of skim stations.....	243,110	280,872
Number of cows per creamery	798	804
Number of cows per patron.....	7	7
Total number of cows.....	632,814	625,512
Number of patrons per creamery.....	116	116
Total number of patrons of creameries.....	92,998	90,364

In answer to the question, "Is the number of cows more or less than a year ago?" about 300 answers were received, of which almost equal numbers were "less," "more," "the same." These answers seem to strengthen the estimate of the number of cows per creamery given above, which shows practically no difference from the number given in the last report.

TABLE No. 2.

COUNTIES.	OWNERSHIP INDIVIDUAL CO-OPERATIVE STOCK COMP.			HOW ISATED.	RECOVERING MILK— BY TEST OR BY CWT.			NEW CREAM- ERIES AND SKIM PLANT PLANTS CLD.		
	Total number of creameries and skim stations.	No. reporting.	Individual.		Separator.	Gathered cream Combined plant.	No. reporting.	By test.	By cwt.	New creameries. New skim stations. Total new cream- eries and skim stations closed or burned.
The state	867	866	501		842	71	858	848	110	66
Adair	12	12	11		12		12	6	6	
Adams	7	7	6		7		7	7		
Allamakee	11	11	1		6	5	10	10		3
Audubon	11	11	1		11		11	11		
Benton	14	14	9		14		14	13	1	1
Black Hawk	16	16	8		15	1	16	18	1	1
Boone	8	8	7		8	1	7	7	1	1
Bremer	24	24	4		24		24	10	14	1
Buchanan	18	18	8		18		18	16	2	1
Buena Vista	10	10	8		10		10	9	1	1
Butler	22	22	5		20	2	22	19	3	
Calhoun	7	7	5		7		7	7		4
Carroll	19	19	11		18		19	9	4	1
Cass	7	7	7		7		7	7		
Cedar	11	11	9		7	4	11	1	10	2
Cerro Gordo	9	9	8		8	1	9	9		3
Cherokee	10	10	8		10		10	6	4	1
Chickasaw	21	21	5		17	4	21	21	1	1
Clarke	6	6	6		6		6	6		1
Clay	9	9	6		9		9	9		
Clayton	21	21	9		18	3	21	21		1
Clinton	14	14	14		14		14	13	1	1
Crawford	2	2	2		2		2	2		5
Dallas	14	14	9		14		14	14	2	3
Davis	2	2	2		2		2	2		1
Decatur	4	4	2		4		4	2	1	1
Delaware	22	22	14		22		22	25	3	3
Dickinson	4	4	2		4		4	4		
Dubuque	23	23	2		22	1	23	12	11	
Emmet	7	7	2		7		7	7		1
Fayette	22	22	2		17	5	21	18	3	2
Floyd	7	7	4		6	1	7	7		1
Franklin	11	11	6		8	3	11	11		1
Greene	9	9	7		9		9	9		1
Grundy	17	17	14		17		17	17		2
Guthrie	14	14	10		14		14	14		1
Hamilton	12	12	6		12		12	11	1	1
Hancock	11	11	3		10	1	11	11		1
Hardin	14	14	3		13	1	14	14		1
Harrison	5	5	3		5		5	5		1
Henry	2	2	2		2		2	2		1
Howard	9	9	5		2	7	9	9		
Humboldt	11	11	1		10	1	11	11		2
Ia.	5	5	5		4	1	5	5		1
Iowa	5	5	5		1	4	5	5		2
Jackson	22	22	16		15	7	22	23		2
Jasper	10	10	6		9	1	10	10		2
Jefferson	6	6	2		6		6	6		2
Johnson	9	9	6		7	2	9	9		1
Jones	29	29	21		28	1	29	27	2	2
Keokuk	2	2	2		2	1	2	3		
Kossuth	21	21	1		21		21	21		1
Lee	1	1			1		1	1		

TABLE No. 2--CONTINUED.

COUNTIES.	OWNERSHIP— INDIVIDUAL, CO-OPERATIVE OR STOCK COMPANY.					HOW OPERATED				RECEIVING MILK— BY TEST OR BY CWT.			NEW CREAM- ERIES AND SKIMST. AND PLANTS CL'D.			
	Total number of creameries and skim stations.	No. reporting.	Individual.	Co-operative.	Stock company.	No. reporting.	Separator.	Gathered cream.	Combined plant.	No. reporting.	By test.	By cwt.	New creameries.	New skim stations.	Total new cream- eries and skim stations.	Plants closed or burned.
Linn.....	29	29	18	4	7	29	29			29	18	11				1
Louisa.....	3	3	3			3				3	3					
Lucas.....	2	2	1		1	2	2			2	2			1	1	
Lyon.....	6	6	4	1	1	6	6			6	4	2	1	1	2	
Madison.....	3	3	2	1		3	3			3	3					1
Mahaska.....	1	1			1	1	1			1	1					
Marion.....	3	3	3			3	1	2		3	3		1		1	1
Marshall.....	12	12	7	5		12	9	2	1	12	12		1	1	2	*1
Mills.....	3	3	3			3		3		1	1					1
Mitchell.....	10	10	1	9		10	2	8		10	10		1		1	
Monona.....	1	1		1		1	1			1	1					
Monroe.....	1	1	1			1	1			1	1					
Montgomery.....	3	3	3			3	3			3	3			1	1	1
Muscatine.....	5	5	3		2	5	4	1		5	2	3	1		1	1
O'Brien.....	6	6	4		2	6	6			6	2	4				
Osceola.....	2	2	2			1	1			1	1		2		2	1
Page.....	7	7	2	2	3	7	7			7	7		1		1	
Palo Alto.....	18	18		17	1	18	18			18	18			1	1	
Plymouth.....	11	11		8	3	11	11			11	10	1	1		1	1
Pocahontas.....	13	13	10	2	1	13	13			13	13		8	3	6	2
Polk.....	7	7	3	1	3	7	7			7	7		1		1	2
Pottawattamie.....	6	6	3	2	1	6	4	2		6	4	2	1		1	
Poweshiek.....	8	8	7	1		8	5	2		8	8		2		2	
Ringgold.....	3	3	2	1		3	2	1		3	3					
Sac.....	15	15	13	1	1	15	15			15	13	2	2	1	3	*1
Scott.....	3	3	3			3	2	1		3	3					
Shelby.....	9	9	3	5	1	9	8	1		9	6	2	1		1	
Sioux.....	10	10	4	1	5	10	10			10	3	7		2	2	
Story.....	15	†14	5	7	2	15	15			15	15		1		1	1
Tama.....	11	11	11			10	8	1	1	10	10			1	1	1
Taylor.....	6	6	4	1	1	6	6			6	5	1				
Union.....	14	14	8	2	4	14	14			14	14					
Van Buren.....	4	4	3		1	4	1	2	1	4	3	1	1		1	1
Wapello.....	4	4	4			4	4			4	4		1		1	1
Warren.....	5	5	4		1	5	5			5	5		1		1	1
Washington.....	6	6	4	1	1	6	4	2		6	6					
Wayne.....	6	6	5		1	6	6			6	6					2
Webster.....	12	12	11	1		12	11		1	12	12		1	2	3	
Winnebago.....	15	15		15		15	15			15	15			1	1	1
Winneshiek.....	13	13	5	8	5	13		9	4	13	13					4
Woodbury.....	7	7	3	1	3	7	7			7	5	2	1		1	3
Worth.....	11	11	2	9		11	10	1		11	11		2		2	
Wright.....	12	12	6	6		12	10		2	12	12		1		1	
The state.....	967,968†	501	349	116	963	842	71	50	950	849	110	56,36	93	79		

* Makes cheese only. † The creamery at Ames is the property of the state and is not included in this classification.

COMPARISONS.

	1898.	1899.
Total number of creameries and skim stations.....	954	987
OWNERSHIP:		
Owned by individual.....	510	501
Owned on co-operative plan.....	343	349
Owned on stock company plan.....	88	116
State property.....	1	1
PLAN OF OPERATION:		
Separator plan.....	788	843
Gathered cream plan.....	66	71
Combinations of the above plans.....	60	50
Not reported.....	40	4
BASIS OF RECEIVING MILK OR CREAM:		
Receiving by the test only.....	746	849
Receiving by weight or measure.....	107	110
Not reported.....	61	8
CREAMERY CHANGES:		
Number of new creameries.....	90	54
Number of new skim stations.....	43	36
Number of plants closed.....	53	79

Five of the plants given as "closed" above have been turned into cheese factories.

STATE DAIRY COMMISSIONER.

55

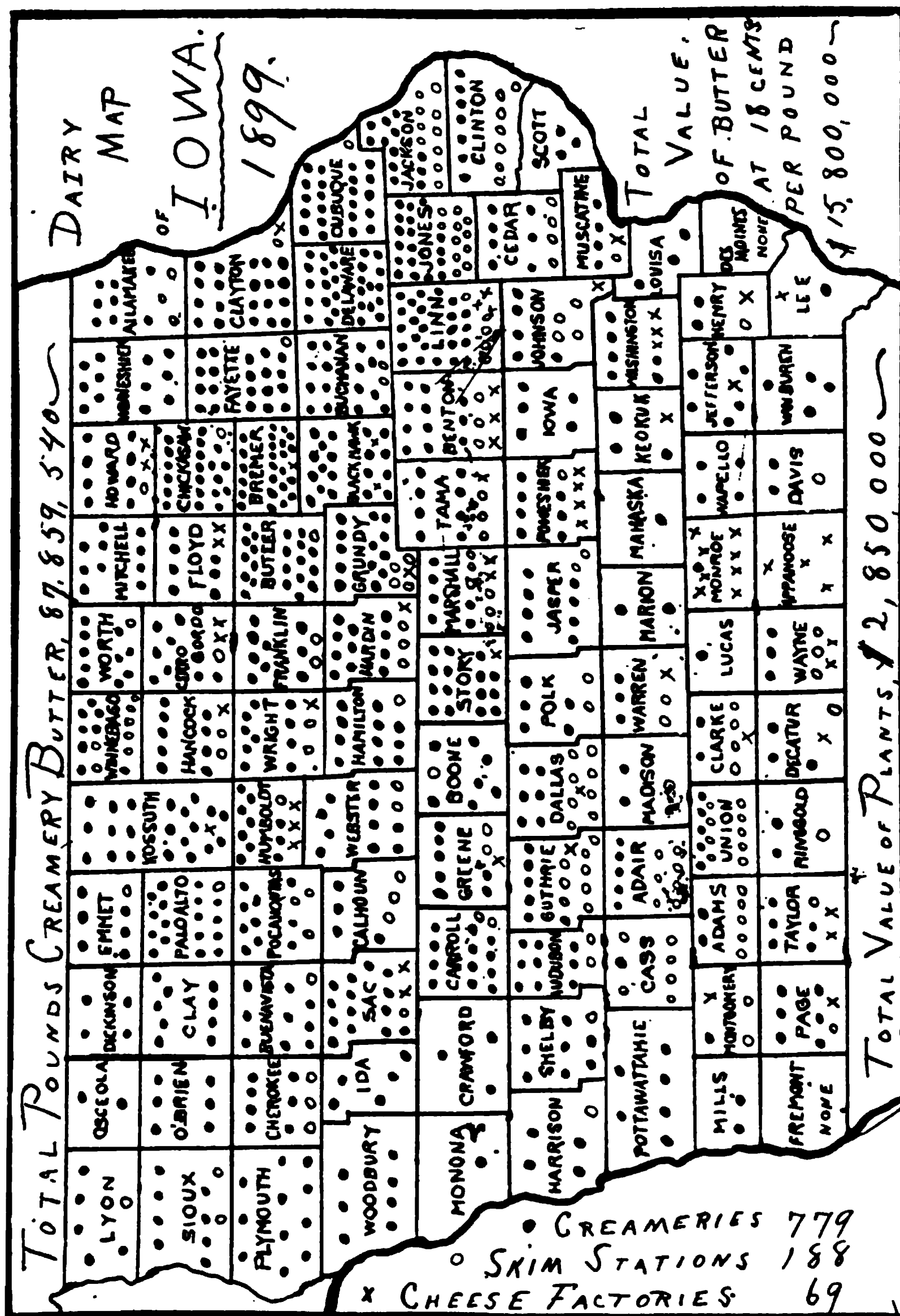
TABLE No. 3.

COUNTIES.	WAGES OF BUTTER-MAKERS.			CHANGES IN EMPLOYMENT.								
	IN CO-OP. AND STK. CO. CN'TY.											
	No. reported.	Average wages.	Av. months em- ployed.									
The state.....	379	\$54.97	11.8	117	\$47.55	11.8	412	104	373	51	755	30
Adair.....	1	50.00	12	2	50.00	12	1	.....	3	1	1	25
Adams.....	1	75.00	12	1	50.00	12	1	.....	1	1	1	25
Allamakee.....	7	57.50	12	1	38.00	12	7	.....	2	1	1	25
Audubon.....	9	69.25	11.8	.....	.....	.....	9	.....	3	.....	3	21
Benton.....	2	55.00	10.6	1	50.00	7	4	.....	3	7	.....	18
Black Hawk.....	12	49.40	11.6	1	35.00	12	12	.....	3	5	.....	16
Boone.....	1	75.00	12	2	43.00	12	1	.....	1	5	1	25
Bremer.....	19	59.42	12	.....	.....	.....	29	.....	6	4	.....	28
Buchanan.....	9	61.33	12	2	45.00	12	9	.....	3	7	.....	12
Buena Vista.....	3	50.00	12	2	47.50	12	3	.....	1	5	1	25
Burlington.....	15	49.00	12	2	50.00	12	14	.....	5	2	1	27
Calhoun.....	2	55.00	12	1	45.00	12	4	.....	3	.....	.....	.....
Carroll.....	2	50.00	11	2	50.00	12	8	.....	1	8	.....	.....
Cass.....	.....	.....	.....	1	60.00	12	.....	.....	1	1	1	100
Cedar.....	2	45.00	12	4	53.75	11	2	.....	.....	4	.....	.....
Cerro Gordo.....	2	57.50	12	4	63.63	11	2	.....	7	1	1	10
Cherokee.....	.....	.....	.....	2	50.00	12	1	.....	.....	6	.....	.....
Chickasaw.....	12	56.75	11.7	5	50.00	12	14	.....	7	5	2	75
Clarke.....	.....	.....	.....	2	52.50	12	4	.....	.....	5	.....	.....
Clay.....	8	45.00	12	2	51.50	10	.....	.....	2	.....	.....	.....
Clayton.....	11	54.59	12	2	53.12	12	10	.....	4	9	1	26
Clinton.....	.....	.....	.....	7	.....	10.7	.....	.....	6	.....	.....	.....
Crawford.....	1	50.00	12	2	45.00	12	1	.....	4	1	1	20
Dallas.....	2	47.50	12	2	50.00	12	2	.....	1	3	.....	20
Davis.....	.....	.....	.....	2	40.00	12	.....	.....	2	.....	.....	.....
Decatur.....	1	50.00	12	1	55.00	9	.....	.....	2	.....	.....	.....
Delaware.....	19	55.15	11.6	2	46.66	12	15	.....	4	15	2	20
Dickinson.....	2	70.00	12	1	60.00	12	2	.....	2	.....	.....	.....
Dubuque.....	12	49.25	11.8	4	48.25	11	12	.....	2	7	.....	12
Emmet.....	5	53.00	12	.....	.....	.....	5	.....	1	1	1	16
Fayette.....	17	55.42	12	2	50.00	12	12	.....	6	4	.....	27
Floyd.....	2	62.50	12	2	45.00	12	2	.....	.....	5	1	14
Franklin.....	4	50.00	10.5	4	50.00	12	4	.....	1	5	2	28
Greene.....	2	47.50	12	4	44.25	11	2	.....	.....	5	.....	.....
Grundy.....	2	53.25	12	6	51.25	12	4	.....	12	.....	.....	.....
Guthrie.....	2	50.00	12	2	50.00	12	2	.....	.....	3	.....	.....
Hamilton.....	5	51.00	12	1	50.00	12	4	.....	2	6	1	20
Hancock.....	7	50.07	12	.....	.....	.....	2	.....	1	1	1	11
Hardin.....	6	57.50	12	1	35.00	12	2	.....	1	4	1	12
Harrison.....	2	55.00	12	.....	.....	.....	2	.....	1	1	1	25
Henry.....	.....	.....	.....	2	44.25	12	1	.....	2	2	2	66
Howard.....	4	53.25	12	4	47.25	12	5	.....	1	3	.....	12
Humboldt.....	6	54.00	12	.....	.....	.....	2	.....	4	.....	4	50
Ida.....	.....	.....	.....	.....	.....	.....	.....	.....	5	4	4	.....
Iowa.....	.....	.....	.....	.....	.....	.....	.....	.....	6	.....	.....	.....
Jackson.....	4	55.31	11	2	60.00	12	5	.....	1	7	1	16
Jasper.....	2	56.50	12	4	55.00	12	2	.....	1	6	2	25
Jefferson.....	4	51.25	12	1	35.00	12	2	.....	1	5	1	25
Johnson.....	1	35.00	12	.....	.....	.....	1	.....	3	.....	.....	.....
Jones.....	6	52.50	11.1	7	52.85	12	7	.....	1	11	2	16
Keokuk.....	1	50.00	12	2	37.50	12	2	.....	.....	1	.....	.....
Kossuth.....	12	55.50	12	.....	.....	.....	20	.....	7	.....	7	23
Lee.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....
Linn.....	7	42.71	12	6	46.16	12	11	.....	2	14	3	24
Louisa.....	.....	.....	.....	2	40.00	12	.....	.....	2	.....	.....	.....

TABLE No. 3—CONTINUED.

COUNTIES.	WAGES OF BUTTER-MAKERS.						CHANGES IN EMPLOYMENT.					
	IN CO-OP. AND ST'K CO. CR'Y.			IN INDIV. CREAMERY.			CO-OP AND ST'K CO. CR'Y.		INDIV. CR'Y.		Total changes.	Per cent of whole number.
	No. reported.	Average wages.	Av. months employed.	No. reported.	Average wages.	Av. months employed.	No. of creameries.	No. of changes.	No. of creameries.	No. of changes.		
Lucas.....							1					
Lyon.....	2	\$32.50	12	1	\$30.00	12	1	1	2		1	8
Madison.....				1	45.00	12	1		2			
Mahaska.....							1					
Marion.....									3			
Marshall.....	4	62.50	13				4	3	2		3	50
Mills.....									2			
Mitchell.....	9	51.88	12				9	2			2	22
Monona.....	1	60.00	12				1					
Monroe.....									1	1	1	100
Montgomery.....									1			
Muscatine.....	3	51.00	12	2	45.00	12			3	2	2	8
O'Brien.....	1	75.00	12	2	42.00	11	2		4			
Osceola.....							1					
Page.....	3	58.33	12				4	2	2		2	23
Palo Alto.....	17	56.20	11.9				17	8			8	47
Plymouth.....	8	55.30	12				10	2	1		2	13
Pocahontas.....	2	57.27	11.3	4	52.50	12			8	1	1	12
Polk.....	8	58.00	12				2		2	1	1	20
Pottawattamie.....	2	50.00	12				2		2	1	1	20
Poweshiek.....	1	50.00	12	3	45.00	9	5					
Ringgold.....	1	45.00	12				1		1			
Sac.....	1	50.00	12	4	42.50	12	2		11	1	1	8
Scott.....				2	45.00	6			2	1	1	23
Shelby.....	3	62.23	12	1	40.00	12	4		2			
Sioux.....	5	57.00	11.2				4		4			
Story.....	10	54.85	12	2	67.50	12	9	1	4		1	8
Tama.....				3	45.00	12	2		6	2	2	25
Taylor.....	2	50.00	12				2	1	2		1	20
Union.....	2	52.50	12	3	58.33	12	2	1	2		1	20
Van Buren.....	1	35.00	6	1	40.00	12	1		2			
Wapello.....				1	20.00	12			4	1	1	25
Warren.....				2	40.00	12			2			
Washington.....	2	47.50	11.5	2	27.50	12	1		5			
Wayne.....	1	50.00	7	1	50.00	12			4	2	2	50
Webster.....	1	50.00	12	2	57.50	12	1		8	2	2	23
Winnebago.....	7	54.43	11.3				8	2			2	25
Winneshiek.....	7	63.85	12	2	35.00	12	10	1	6	1	2	12
Woodbury.....	2	45.00	9	1	50.00	8	4		5	1	1	11
Worth.....	8	58.75	12	1	60.00	12	7	2	1		2	25
Wright.....	4	48.75	12	2	45.00	12	4	2	5		2	22
The state.....	279	\$54.97	11.8	175	\$47.53	11.8	412	104	272	61	155	20

Average wages of all butter-makers, \$53.77.
Last year the averages wages, \$53.63.



Greene	7	9,118,000	303,235	3,575	23,425	203,235	.....	.....	.....	.....
Grundy	13	20,952,500	1,254,951	87,905	12,130	1,154,826	.....	.....	.....	.....
Guthrie	6	12,051,526	573,235	8,700	315,800	253,735	.....	.....	.....	.....
Hamilton	11	23,450,000	979,100	50,600	28,000	900,500	.....	.....	.....	.....
Hancock	9	12,252,000	533,425	22,533	4,084	496,759	.....	10,000	.....	58,400
Hardin	11	20,674,525	301,900	42,700	30,000	319,200	.....	.....	.....	.....
Harrison	4	5,451,630	333,833	16,140	54,800	165,933	.....	.....	.....	.....
Henry	2	1,892,000	73,000	330	37,000	40,140	.....	.....	.....	.....
Howard	8	10,930,000	403,140	7,200	8,500	446,440	.....	.....	.....	361,200
Humboldt	10	19,552,000	890,723	30,990	13,361	855,375	.....	.....	.....	.....
Ida	5	3,595,000	152,000	.....	.....	152,000	.....	.....	.....	.....
Iowa	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Jackson	13	6,234,300	224,470	5,200	2,000	227,270	.....	2,100	.....	153,900
Jasper	9	10,033,000	424,530	5,730	23,370	394,830	.....	6,250	.....	308,370
Jefferson	6	5,970,200	230,951	14,530	16,675	239,706	.....	7,500	.....	99,900
Johnson	5	1,046,000	42,840	1,900	600	40,340	.....	.....	.....	.....
Jones	18	57,873,000	2,545,906	83,531	33,770	2,375,305	.....	8,000	.....	42,000
Keokuk	3	2,655,000	106,512	.....	53,400	55,112	.....	.....	.....	.....
Kossuth	21	48,112,830	2,105,999	170,233	25,513	1,910,083	.....	24,550	.....	125,723
Lee	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Linn	24	24,719,000	984,975	59,175	64,230	861,520	.....	.....	.....	.....
Louisa	3	.....	.....	.....	.....	.....	.....	24,000	.....	51,000
Lucas	1	1,363,000	59,440	4,160	44,224	11,056	.....	.....	.....	.....
Lyon	5	2,924,000	134,938	11,439	.....	123,509	.....	.....	.....	.....
Madison	2	1,200,000	54,554	2,700	20,000	31,854	.....	.....	.....	.....
Mahaska	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Marion	3	.....	.....	.....	.....	.....	.....	.....	.....	.....
Marshall	6	2,250,000	90,000	2,200	10,630	77,120	.....	.....	.....	.....
Mills	2	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mitchell	10	1,139,460	53,750	6,000	.....	47,750	.....	22,340	.....	1,763,931
Monona	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Monroe	1	1,141,320	51,915	2,973	20,979	27,933	.....	.....	.....	.....
Montgomery	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Muscatine	4	1,850,000	92,500	700	12,200	73,600	.....	.....	.....	.....
O'Brien	6	4,497,307	208,439	6,447	360	201,633	.....	38,000	.....	154,800
Osceola	2	.....	.....	.....	.....	.....	.....	.....	.....	.....
Page	6	2,870,000	117,654	3,000	233,000	35,854	.....	.....	.....	.....
Palo Alto	17	42,250,975	1,933,103	173,690	48,273	1,673,041	.....	.....	.....	.....
Plymouth	11	14,894,146	611,773	24,643	.....	577,130	.....	.....	.....	.....
Pocahontas	9	11,492,000	433,373	20,320	3,060	456,103	.....	.....	.....	.....
Polk	5	9,573,000	412,061	18,000	303,000	34,061	.....	.....	.....	.....
Pottawattamie	6	8,023,636	130,343	5,300	24,050	100,493	.....	.....	.....	.....
Poweshiek	7	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ringgold	2	1,752,000	76,779	5,700	300	70,779	.....	.....	.....	.....
Sac	14	18,707,250	735,297	19,037	12,330	732,290	.....	.....	.....	.....
Scott	3	1,323,000	54,770	650	54,000	120	.....	.....	.....	.....
Shelby	8	12,314,000	570,750	18,677	1,700	550,373	.....	10,000	.....	6,000
Sioux	5	9,533,000	365,103	9,933	16,325	368,839	.....	.....	.....	.....
Story	15	31,237,000	1,332,691	74,634	54,337	1,253,239	.....	.....	.....	.....
Tama	6	5,635,000	241,933	12,200	.....	239,733	.....	.....	.....	.....

TABLE No. 5.

Butter Shipments, as Reported by the Creameries

COUNTIES.	NEW YORK. 65 84 %.	CHICAGO. 12.04 %.	BOSTON. 7.39 %.	SOUTH. 4.18 %.	PHILA- DELPHIA. 2 51 %.	WEST. 1 55 %.	CLEVE- LAND. 1 34 %.
The state.....	35,033,429	6,459,885	8,981,040	2,242,000	1,854,400	836,120	722,000
Adair		451,399			80,000		
Adams		822,000					
Allamakee.....	648,461	110,800			339,800		
Audubon	305,000	91,800	267,400				148,000
Benton	187,600	94,200					
Black Hawk.....	691,600	152,800	8,500	221,500			213,600
Boone	331,100	95,000	11,800				
Bremer.....	1,723,060	192,300	219,200		8,700		237,000
Buchanan.....	1,307,460	121,670	170,000	40,000	5,000	14,000	
Buena Vista.....	213,000				74,000		
Butler.....	1,487,850	77,850	76,040				
Calhoun	66,000	205,000			50,000		
Carroll.....	499,600	21,600					
Cass	535,300						
Cedar	136,000	191,000					
Cerro Gordo....	80,000	21,500					
Cherokee	35,500	2,300					
Chickasaw.....	1,085,000	92,950	549,500	100,000	600		
Clarke.....				150,000			
Clay.....	300,500	16,000					
Clayton	1,622,600	127,000	130,000	230,000	39,500		
Crawford	189,000	32,600					
Dallas	237,000	32,000	17,200				
Davis.....	75,000	4,000			36,000		
Delaware.....	2,196,300	80,600	44,200	17,000	41,800		
Dickinson.....	310,000	16,000					
Dubuque.....	1,109,200	12,700	70,200		1,100		
Emmet.....	297,700	6,000					
Fayette.....	1,600,230	403,550	231,000	96,500	15,000		8,400
Floyd	566,200	48,000					
Franklin	341,000	11,800		20,500	5,000		
Greene.....	71,200	293,150				120	
Grundy	718,100	62,505	92,000				100,000
Guthrie.....	66,510	171,000					
Hamilton	503,000	38,000		46,500			
Hancock.....	488,995	11,300					
Hardin.....	781,500	17,800					
Harrison	9,500	52,000					
Henry	32,000						
Howard.....	464,200	9,000	63,700	223,000	500		
Humboldt	696,600	159,000					
Ida.....	114,000	38,000					
Iowa	151,000						
Jackson	74,000	306,000		46,000			
Jasper.....	272,000	10,000			78,000		
Jefferson...	65,000	19,000			25,000		
Johnson.....	56,000	24,500					
Jones.....	1,034,100	26,500	964,100	67,000	7,200	12,000	
Keokuk.....	179,250	2,000					
Kossuth.....	1,524,960	397,500					
Linn.....	473,000	21,500	108,600	114,000			
Louisa.....	36,000	15,000					
Lyon	64,421		60,000				
Madison.....	16,000				60,000		
Mahaska	60,000						
Marion.....	17,300						
Marshall.....	100,000	10,000	320,000			50,000	
Mitchell.....	1,062,750	716				740,000	
Monroe.....	20,900	1,800			5,500		
Muscatine.....	93,000	20,000		115,000	15,000		

TABLE No. 5—CONTINUED.

COUNTIES.	NEW YORK. 66.84 %.	CHICAGO. 12.04 %.	BOSTON. 7.39 %.	SOUTH. 4.18 %.	PHILA- DELPHIA. 2.51 %.	WEST. 1.55 %.	CLEVE- LAND. 1.34 %.
O'Brien	86,670	33,200	.....	.....	.....	.....	.....
Page	58,000	8,000	.....	.....	.....	20,000	.....
Palo Alto	1,241,465	213,215	100,000	.....	.....	.....	.....
Plymouth	428,787	150,000	.....	.....	.....	.....	.....
Pocahontas	317,100	76,300	22,000	22,000	22,000	.....	.....
Polk	40,700	.....	.....	.....	.....	.....	.....
Pottawattamie....	174,400	202,200	.....	.....	37,000	.....	.....
Poweshiek	83,000	111,000	.....	.....	16,000	.....	.....
Ringgold	71,000	22,000	.....	6,000	.....	.....	.....
Sac	303,980	52,380	.....	.....	.....	.....	.....
Scott .....	.....	6,000	.....	.....	.....	.....	.....
Shelby	545,500	21,000	81,000	.....	.....	.....	25,000
Sioux	221,140	32,200	.....	.....	.....	.....	.....
Story	976,530	108,000	11,000	.....	2,000	.....	.....
Tama	76,500	30,000	.....	.....	.....	.....	.....
Taylor	140,500	.....	.....	.....	.....	.....	.....
Union	45,000	270,000	.....	560,000	.....	.....	.....
Van Buren	19,000	15,000	.....	15,000	.....	.....	.....
Wapello .....	.....	2,300	.....	.....	.....	.....	.....
Warren	20,000	.....	.....	.....	13,000	.....	.....
Washington	212,700	99,000	78,000	.....	.....	.....	.....
Webster	224,500	15,500	600	.....	10,500	.....	.....
Winnebago	606,900	4,000	.....	.....	2,600	.....	.....
Winneshiek	459,000	6,400	248,000	100,000	277,000	.....	.....
Woodbury	45,000	36,700	.....	.....	8,600	.....	.....
Worth	871,400	5,000	.....	.....	63,000	.....	.....
Wright	364,880	187,000	.....	.....	.....	.....	.....
Total	35,033,429	6,489,885	3,984,040	2,242,000	1,351,400	836,120	722,000

Total shipments reported 53,901,354 pounds.

Shipments were also reported as follows:

Newark, N. J.....	672,280
Pittsburg	369,300
Elgin	301,000
New Haven	240,600
Washington, D. C.	258,000
Massachusetts	197,000
Providence.....	174,000
Baltimore.....	153,700
Hartford.....	83,000
Exported	118,320

It will be noticed that the total of these shipments is but little more than half the make of the creameries of the state, and possibly complete statistics would somewhat change the totals for each destination.

FINANCIAL STATEMENT FROM NOVEMBER 1, 1898, TO NOVEMBER 1, 1899.

Commissioner's salary.....	\$1,454.15	
Commissioner's expense.....	447.24	
Total.....		\$1,901.39
Clerk's salary.....	\$ 900.00	
Extra office help.....	112.50	
Total.....		1,020.50
Milk inspectors' fee account.....	\$1,581.00	
Milk inspectors' expense.....	86.70	
Milk inspectors' special work.....	59.27	
Total.....		1,726.97
Special office expense.....	\$ 36.59	
Chemical analyses.....	45.00	
10,000 dairy law pamphlets	49.00	
Total.....		130.59
Express account.....		41.78
Telegraph account		2.70
Total expense.....		\$4,823.93
Total receipts, for 676 milk permits		676.00
Balance of appropriation still available.....		2,759.84

THIRTEENTH ANNUAL REPORT OF THE
CHEESE-MAKING IN IOWA.

The accompanying cut, kindly furnished by Prof. John W. Decker, professor of dairying at the University of Wisconsin, is the text of the following. Only 15 of the 69 cheese factories in Iowa pay for milk according to the test of butter fat. Certainly the tendency on the part of the patron of a cheese factory that pays him for the weight of his milk regardless of the

quality of it, will be to produce the greatest weight of milk regardless of all other considerations. The quality of the milk as regards butter fat will certainly lessen under such incentive. The quality of the cheese made will also be poor if the fat content of the milk is low. A study of the above cut will show that the weights do not increase in the same proportion as the increase in butter fat, but nearly so; and when we consider that the quality of the richer cheese is better than that of the others, it is evident that the factory ought to pay for the milk in proportion to the amount of fat in the milk, in order to give every man what belongs to him. It is most difficult to understand why cheese factories and creameries will continue to pay for milk by weight, when it is so easy to test the milk and is so plainly the proper way to pay for it.

TABLE No. 6.

Cheese Factories, Their Value and Their Product.

COUNTIES.	No. of cheese factories.	No. reporting.	Total value of factories reported.	No. reporting.	Pounds of milk received.	Pounds cheese made.	No. reporting.	Sold in Iowa.	Shipped.
Appanoose.....	4	3	\$1,700	3	845,000	79,300	3	67,300	12,000
Benton.....	1	1	5,900						
Black Hawk.....	1	1	4,000		51	100	1	150,000	
Cerro Gordo.....	1	1	2,000		45	170	1	75,000	3,775
Floyd.....	1	1	7,500		86	110	1	185,810	20,000
Howard.....	1	1	2,800		00	00	1	66,000	6,000
Humboldt.....	1	1	2,500		00	73	1	51,575	15,000
Monroe.....	1	1	1,100		00	145	1	117,805	
Poweshiek.....	1	1	7,800		88	57	1	238,087	3,000
Taylor.....	1	1	2,300		00	00	1	94,000	80,000
Washington.....	1	1	2,700		56	50	1	119,750	7,800
Wayne.....	1	1	2,700		80	170	1	111,070	45,000
Bremer.....									
Clayton.....									
Clarke.....									
Dallas.....									
Decatur.....									
Greene.....									
Grundv.....									
Guthrie.....									
Hancock.....									
Hardin.....									
Henry.....									
Jefferson.....									
Johnson.....									
Keokuk.....	33	17	34,350	17	9,940,969	900,514	17	988,354	45,180
Kossuth.....									
Lee.....									
Linn (2).....									
Marshall (2).....									
Montgomery.....									
Muscatine.....									
Page.....									
Ringgold (2).....									
Sac (2).....									
Story.....									
Tama.....									
Warren.....									
Wright.....									
Total.....	68	53	\$41,350	45	24,170,509	2,302,395	47	2,152,145	240,708

Reports from cheese factories show that the cows whose milk is sent to the factory produce about half as much milk as those whose milk is sent to the creameries; from which fact it is evident that the cheese factory is not an incentive to intensive dairying. There are perhaps a dozen factories in the state that are doing a good business and are of great benefit to the farmers in their communities. The others are in the main small affairs which have started as private factories and buy merely to accommodate the neighborhood. They are no doubt profitable to their owners and operators but do not compare in importance to the same number of creameries. The sixty-nine factories received 27,000,000 pounds of milk, which is about the same amount of milk as handled by fifteen average creameries.

Greene.....	7	9,118,000	302,235	2,575	22,425	205,225	.....	.....	.....	.....	.....	.....
Grundy.....	12	20,963,500	1,254,951	87,905	12,120	1,164,826	.....	.....	.....	.....	.....	.....
Guthrie.....	6	12,081,525	578,285	8,700	815,800	253,785	.....	.....	.....	.....	.....	.....
Hamilton.....	11	22,450,000	979,100	50,600	28,000	900,500	.....	.....	.....	.....	.....	.....
Hancock.....	9	12,252,000	523,425	22,522	4,084	496,759	.....	.....	.....	10,000	.....	53,400
Hardin.....	11	20,674,525	891,900	42,700	30,000	819,200	.....	.....	.....	.....	.....	.....
Harrison.....	4	5,451,020	236,868	16,140	64,800	165,928	.....	.....	.....	.....	.....	.....
Henry.....	2	1,392,000	78,000	800	37,000	40,140	.....	.....	.....	.....	.....	.....
Howard.....	8	10,980,000	462,140	7,200	8,500	446,440	.....	.....	.....	.....	.....	261,200
Humboldt.....	10	19,653,000	800,726	20,900	12,261	855,375	.....	.....	.....	.....	.....	.....
Ida.....	5	3,595,000	152,600	.....	.....	152,600	.....	.....	.....	.....	.....	.....
Iowa.....	5	6,284,800	224,470	5,200	.....	227,270	.....	.....	.....	2,100	.....	153,900
Jackson.....	12	10,026,000	424,520	5,780	22,270	294,890	.....	.....	.....	6,250	.....	208,270
Jasper.....	9	5,970,200	260,921	14,520	16,875	269,703	.....	.....	.....	7,500	.....	90,900
Jefferson.....	6	1,046,000	42,840	1,900	600	40,240	.....	.....	.....	.....	.....	.....
Johnson.....	5	57,878,000	2,545,906	82,821	86,770	2,375,205	.....	.....	.....	8,000	.....	42,000
Jones.....	15	2,655,000	102,512	.....	52,400	55,112	.....	.....	.....	.....	.....	.....
Keokuk.....	3	48,112,880	2,105,999	170,208	25,612	1,910,088	.....	.....	.....	24,550	.....	125,722
Kossuth.....	21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lee.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Linn.....	24	24,719,000	984,975	59,175	64,220	861,520	.....	.....	.....	.....	.....	.....
Louisa.....	3	.....	.....	.....	.....	.....	.....	.....	.....	24,000	.....	51,000
Lucas.....	1	1,268,000	50,440	4,160	44,224	11,056	.....	.....	.....	.....	.....	.....
Lyon.....	5	2,924,000	124,928	11,420	.....	123,509	.....	.....	.....	.....	.....	.....
Madison.....	2	1,200,000	54,554	2,700	20,000	31,854	.....	.....	.....	.....	.....	.....
Mahaska.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Marion.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Marshall.....	6	2,250,000	90,000	2,200	10,660	77,120	.....	.....	.....	.....	.....	.....
Mills.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mitchell.....	10	1,189,400	52,750	6,000	.....	47,750	.....	.....	.....	22,240	.....	1,762,921
Monona.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Monroe.....	1	1,141,220	51,915	2,272	20,279	27,923	.....	.....	.....	.....	.....	.....
Montgomery.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Muscataine.....	4	1,850,000	92,500	700	12,200	78,600	.....	.....	.....	.....	.....	.....
O'Brien.....	6	4,497,207	208,420	6,447	200	201,622	.....	.....	.....	.....	.....	.....
Osceola.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Page.....	6	2,870,000	117,654	2,000	228,000	85,854	.....	.....	.....	.....	.....	.....
Palo Alto.....	17	42,260,975	1,902,102	176,690	48,272	1,673,041	.....	.....	.....	.....	.....	.....
Plymouth.....	11	14,894,142	611,772	24,642	.....	577,120	.....	.....	.....	.....	.....	.....
Pocahontas.....	9	11,422,000	422,272	20,220	2,050	429,102	.....	.....	.....	.....	.....	.....
Polk.....	5	9,578,000	412,061	18,000	202,000	86,061	.....	.....	.....	.....	.....	.....
Pottawattamie.....	6	8,022,626	120,242	6,800	24,050	100,492	.....	.....	.....	.....	.....	.....
Poweshiek.....	7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ringgold.....	2	1,752,000	76,779	5,700	200	70,779	.....	.....	.....	.....	.....	.....
Sac.....	14	18,707,260	795,297	19,627	12,220	762,280	.....	.....	.....	.....	.....	.....
Scott.....	2	1,222,000	54,770	650	54,000	120	.....	.....	.....	.....	.....	.....
Shelby.....	8	12,214,000	570,750	18,677	1,700	550,272	.....	.....	.....	.....	.....	.....
Sioux.....	8	9,529,000	206,102	9,922	16,225	202,222	.....	.....	.....	.....	.....	.....
Story.....	15	21,227,000	1,222,691	74,624	54,527	1,253,220	.....	.....	.....	.....	.....	.....
Tama.....	6	5,625,000	241,926	12,200	.....	229,726	.....	.....	.....	.....	.....	.....

TABLE No. 5.

Butter Shipments, as Reported by the Creameries

COUNTIES.	NEW YORK. 66 84 %.	CHICAGO. 12.04 %.	BOSTON. 7.39 %.	SOUTH. 4.18 %.	PHILA- DELPHIA. 2 51 %.	WEST. 1 55 %.	CLEVE- LAND. 1 34 %.
The state.....	85,033,429	6,459,885	8,981,040	2,242,000	1,854,400	836,120	722,000
Adair		451,899			80,000		
Adams		822,000					
Allamakee.....	648,461	110,800			339,800		
Audubon	306,000	91,800	267,400				148,000
Benton	187,600	94,200					
Black Hawk.....	691,600	152,200	3,500	221,500			218,600
Boone	331,100	95,000	11,800				
Bremer.....	1,723,060	192,300	219,200		3,700		237,000
Buchanan.....	1,307,460	121,670	170,000	40,000	5,000	14,000	
Buena Vista.....	213,000				74,000		
Butler.....	1,487,850	77,850	76,040				
Calhoun	66,000	205,000			50,000		
Carroll.....	499,640	21,600					
Cass	535,300						
Cedar	136,000	191,000					
Cerro Gordo.....	80,000	21,500					
Cherokee	35,500	2,300					
Chickasaw.....	1,065,000	92,950	549,500	100,000	600		
Clarke.....				150,000			
Clay.....	300,500	16,000					
Clayton	1,622,600	127,000	120,000	230,000	39,500		
Crawford	189,000	23,600					
Dallas	237,000	32,000	17,200				
Davis.....	75,000	4,000			26,000		
Delaware.....	2,196,300	60,600	41,200	17,000	41,800		
Dickinson.....	310,000	16,000					
Dubuque.....	1,104,200	12,700	70,200		1,100		
Emmet.....	297,700	6,000					
Fayette.....	1,600,250	403,550	231,000	96,500	15,000		8,400
Floyd	566,200	48,000					
Franklin	341,000	11,800		20,500	5,000		
Greene.....	71,200	298,150				120	
Grundy	718,100	62,505	92,000				100,000
Guthrie.....	66,540	171,000					
Hamilton	508,000	33,000		46,500			
Hancock.....	488,995	11,300					
Hardin.....	781,500	17,800					
Harrison	9,500	52,000					
Henry	32,000						
Howard.....	464,200	9,000	63,700	225,000	500		
Humboldt.....	696,600	159,000					
Ida.....	114,000	28,000					
Iowa	154,000						
Jackson	74,000	308,000		46,000			
Jasper.....	272,000	10,000			78,000		
Jefferson...	65,000	19,000			25,000		
Johnson.....	56,000	24,500					
Jones.....	1,034,100	28,500	964,100	67,000	7,200	12,000	
Keokuk.....	179,250	2,000					
Kossuth.....	1,524,960	397,500					
Linn.....	473,000	21,500	108,600	114,000			
Louisa.....	36,000	15,000					
Lyon	64,421		60,000				
Madison.....	16,000						
Mahaska	60,000				60,000		
Marion.....	17,300						
Marshall.....	100,000	10,000	320,000			50,000	
Mitchell.....	1,062,750	716				740,000	
Monroe.....	20,900	1,800			5,500		
Muscatine.....	93,000	20,000		115,000	15,000		

stamped upon each package, roll, parcel, or vessel containing the same, so as to be and remain at all times readily visible, or unless the person purchasing the same is fully informed by the seller of the true names of the ingredients of such articles at the time of making the sale thereof or offering to sell the same.

The seller of adulterated milk may offer as a defense, according to this decision, that the buyer was informed by the seller at the time of making the sale of the true names and ingredients of the adulteration, the ingredients so used not being injurious to health. The dairy commissioner will appeal from the decision for the purpose of getting a supreme court ruling.

The judge says: "No person shall sell as pure milk that which has been diluted with water, or into which there has been introduced any foreign substance or thing, even though the foreign substance be positively beneficial, rather than deleterious."

The decision in full follows:

The defendant is charged with a violation of section 4989 of the code. That section provides in brief that if any person shall sell or expose for sale or deliver or bring to another for domestic or potable use or to be converted into any product of human food any unclean, impure, unhealthy, adulterated, unwholesome or skimmed milk, he shall be subject to a fine and be liable for double damages to the person or persons upon whom such fraud shall be committed. Section 4990 of the code immediately following provides that for the purpose of this chapter the addition of water or any other substance or thing to whole milk or skimmed milk is declared to be an adulteration.

This cause has been tried to a jury, resulting in a verdict of guilty, and it is before me now upon a motion in arrest of judgment and for a new trial. The facts in the case are that at the time complained of the defendant was a milk dealer in the city of Des Moines, and that for the purpose of preserving his milk from souring he added thereto a small quantity of boracic acid in solution.

The person named in the information to whom a sale of such milk was made had been told that defendant was using such solution of boracic acid in his milk. The uncontradicted testimony in the case was to the effect that the use of boracic acid in the quantities shown was absolutely harmless even to the most delicate infant. This testimony came from the chemist of the state board of health and from several of the most reputable physicians of the city, all agreeing upon the proposition, and the state making no effort to contradict the same. Upon the close of the testimony I instructed the jury, following the language of the statute literally, and said that if it appeared the defendant put anything into his milk he should be found guilty. I said, however, to counsel, that I would reserve for hearing in arrest of upon motion for new trial the questions in the case raised by counsel for the defendant which are now before me.

It is contended by the defendant that the statute is unconstitutional in that it was not competent for the legislature to place any such restriction

upon the dealing in milk into which a harmless preparation had been put, the design being to secure the preservation of the milk, and such only.

Now, it is a well known principle of construction often reiterated by the supreme court of this and other states, that a statute provision will not be held unconstitutional if, following any reasonable method of construction, its provisions can be made to harmonize with the provisions of the constitution. I am to assume that the legislature intended to frame an enactment in harmony with the constitution and not in opposition to it, and I am not to say that any particular statute is repugnant to the constitution save that upon any fair consideration thereof I am not able to reconcile it with the constitution. That is to say, the statute must be held to be void only when such statute and the constitution cannot both stand and be made operative together.

I am first to inquire whether it be within the province of the legislature to prohibit by statutory enactment the dealing in milk in which a preservative has been placed, harmless in itself and productive of no evil results when employed in connection with the milk. The statute in question is found in the criminal code, and under the general chapter heading, "Offenses against the public health." My motion is that the power of the legislature to interfere in the ordinary business transactions of mankind of the character and nature here in question is limited to two subjects. The general subject comes under the head of police regulations, and the power may be exercised whenever, in the judgment of the legislature, the doing of an act sought to be prohibited would operate as a fraud on the one hand, or would be injurious to the health of the citizens of the state on the other hand. To state the proposition somewhat differently, the legislature has power incident to its rights to make all needful or necessary police regulations, to prohibit anything which might be made an engine of fraud, or which might work harm to the health of the citizens.

I do not understand that the power of the legislature goes any further than that. It follows, therefore, that if by the statute under consideration the legislature has gone farther than the general power conferred upon it warrants, the acts must be held to be void. While there are some cases which seem to hold to the contrary, yet I think the weight of authority and certainly the better reasoning supports the doctrine that as between citizens of the state they may deal at their pleasure in legitimate commodities without legislative restriction, the rule being qualified always by the fact that no element of fraud appears, and there being nothing incident to the commodity dealt in which renders it injurious to the public health. In a number of cases it has been held, and this by the supreme court of the United States, as well as several of the courts of last resort in states, that there could be no restriction of the sale of oleomargarine, in itself harmless to the public health, provided that it was so labeled and offered for sale that the person buying it could not be deceived as to the true character of the article.

Applying that principle to the case at bar, I cannot conceive of any reason why a person who desired to buy milk containing a slight quantity of boracic acid should not be permitted to do so, nor can I conceive upon what principle the legislature, as against the rights reserved to the people in the constitution, could interfere with such a transaction. Nor did the

legislature intend here to so interfere. As I have said before, I am bound to hold in the negative if I can reasonably construe the statute to such an end. I think it is susceptible of such construction. Reading the section through, it clearly refers to sales of pure milk, and the thought of the statute seems to me to be that no person shall sell as pure milk that which has been diluted with water or into which there has been introduced any foreign substance or thing, even though such foreign substance may be positively beneficial, rather than deleterious. In other words, the proposition of the statute is to protect the people who desire to buy pure milk from having palmed off upon them milk which has been diluted or adulterated.

The design of the statute was to prevent fraud and it seems to me that this is clearly evidenced in the language of the statute itself, for in section 4989 I find that after prohibiting the sale, exchange or delivery of adulterated milk, the further provision appears in the same connection that the person so selling or delivering shall be liable for double damages to the person or persons upon whom such fraud shall be committed. Now, clearly if any person desiring to buy pure milk shall receive instead thereof milk into which has been introduced a compound of foreign substance even though not harmful to the health, the purchaser has not received that which he intended to buy. He may have intended, and surely it was his right, to buy milk which he desired to have sour in the ordinary course of nature, and therefore in which no preservative was desired. The sale, therefore, of preserved milk to him, even though harmless as to health, would be a fraud. To sum up, it seems to me the purpose of the state is simply to say to all dealers in milk, and other dairy products, or commodities designed to take the place thereof, that that which they offer for sale shall be exactly what it purports to be. If what is offered as pure milk is adulterated or impure in the sense that a foreign substance has been introduced therein the sale thereof is prohibited by statute. If, on the other hand, any milk be offered for sale into which there has been introduced a preservative, and it is offered for sale as such with the knowledge of the adulteration, then the sale thereof is not prohibited by the statute, save and except that it shall be ascertained and determined that the adulteration is not harmful to the public health.

I am constrained, therefore, to hold that the statute under consideration is not in conflict with the constitution, but that it means simply that dairy products and all imitations thereof not harmful to the public health may be exposed for sale and sold in this state, providing always that the commodity so offered for sale or sold is put upon the market for what it actually is, and consequently no room is left upon which to predicate a charge of fraud. Now, in this case, the person to whom it is charged the defendant sold milk in which the preservative complained of had been introduced knew what he was buying. There was no fraud, as far as he was concerned, and it being conceded that the adulteration was harmless in respect to the health of those who might use it, the defendant should not, therefore, have been found guilty of any criminal violation of the law.

The verdict of the jury will therefore be set aside and the defendant be discharged from any further liability in this case, and his bond exonerated.

Mr. A. D. Ehle, having been arrested on a warrant sworn out before Justice Halloran, came to trial on the 26th of July for the alleged crime of selling adulterated milk. The evidence of the prosecution, in brief, was to the effect that City Milk Inspector C. C. Chase, in the course of his duties, obtained samples of milk from the store of Ehle, took the same to Prof. S. R. Macy for analysis, who found boracic acid therein, and that the same was a preservative. The defense called as witnesses several physicians of the city who gave testimony to the effect that boracic acid in small quantities used as a preservative was not injurious to the health, but that in larger quantities might be deleterious. The defense, represented by Attorney Hume, of the city, and the attorney of the Chicago Preservative company, of which company Ehle was presumably the local agent, argued that boracic acid was not injurious and therefore could not be considered as an adulterant. This in the face of the plain statement in the law that "the addition of water or any other substance or thing to whole milk or skimmed milk or partially skimmed milk is hereby declared an adulteration."—Section 4990. They further argued that if it was so declared an adulterant that the law was unconstitutional as violating the rights of property.

Both the prosecution and the defense filed voluminous briefs with numerous citations of law and supreme court decisions and the justice, after a couple of weeks' deliberation, gave his decision. He held that the use of boracic acid, even if not injurious, was an adulteration; that it was used in the milk for the purpose of defrauding the buyer of it, and hence that the law was fully within the powers of the legislature to pass because it was intended to prevent fraud; that the defendant Ehle admitted under oath that he put boracic acid in the milk; that in order to avoid the penalty of the law a dealer must inform his patrons of the exact adulteration used. The last clause is based on section 4986, known as the labeling law, which applies to all adulterated food products, and requires that they be labeled as to their exact adulteration and that the customer shall be informed definitely just what he is buying.

It will be seen that the justice fully sustained the law in all its particulars and this department is confident that the high courts of this state will agree with this decision and similar decisions in other states to the same effect, as soon as a case is presented to them for adjudication.

The justice discharged the defendant on the ground that the prosecution had not adduced evidence to show that the milk under discussion had been offered for sale *for domestic or potable use or for any human food product*. The information, which was drawn by the justice himself, and therefore supposedly sufficient in his own court, did not charge the offering for sale for domestic use. This department regretted that any oversight on the part of the justice in drawing the information, or the state in prosecuting the same should have resulted in an acquittal. It was greatly desired that the case be left in such shape that an appeal could be taken, especially as such appeal would evidently have been at the expense of the Chicago Preservative company, who seemed to be backing the defendant in his attempt to overrule the law. In fact, the decision boiled down might be, that the defendant was guilty but the state did not prove it.

In September complaint was made by the dairy commissioner against seven dairymen of the city of Burlington for the use of a milk preserver in their product sold in that city. These cases are still pending in the courts of Burlington.

All the foregoing cases of adulteration of milk have arisen through the use of preservatives. This office will not tolerate any known violation of the law by the use of preservatives or other adulterations

KEEPING MILK IN HOT WEATHER.

The use of preservatives is not warranted either by necessity or good policy. The consumer will not buy milk if he knows that he is getting it partially embalmed. He does not need any testimony in regard to the beneficial results that may come to his or his children's stomachs by the use of milk that is preserved. He simply will not buy adulterated milk if he knows it. The law is designed to protect him and to insure that he gets what he buys. A milkman known to use chemical preservatives will soon lose his trade. Good policy dictates to the milkman that he furnish milk that is clean, unadulterated, and wholesome. If he can establish a reputation for furnishing that kind of milk, he will find easy sale for all of it he can produce. But milk sometimes sours quickly. To avoid this the milk must be *clean*. The unclean dairy pays the penalty by the souring of the milk. The milk must be drawn by clean milkers, into clean pails, cooled immediately to as low temperature as

possible and kept there till it is sold. Ice is a necessity during the hot weather in the summer. A curious feature of the prosecutions undertaken by this department the past year for adulteration of milk, is that the defendants in all the cases have been liberal users of ice. The plea that the preservative is used to save ice is false. It is used, if at all, to overcome the effects of the filth that is in the milk. Dirty milk sours quickly. Clean milk will sour much more slowly. Milk utensils are not clean until they have been scalded with boiling water in a most thorough manner. Milk absorbs odors and bacteria of putrefaction fall into it when it is left in an unwholesome place. Cool the milk by aerating it in a clean place, put it in clean cans in a clean cool place and it will keep sweet a length of time that will surprise you. But milk it into a half washed pail and pour it into a can equally foul, leave in the barn over night, and it will most certainly need something to make it sweet. The use of a chemical preservative is a confession that the dairyman will not take the trouble to keep his milk sweet.

RECORD OF MILK TESTS.

Following is a record of the tests of milk sold in the different cities of the state where inspection is carried on, giving name of the dealer and month of the tests. The figures are averages of all the tests made during the month, and not single tests. The figures for the tests of cream are averages for the year.

BURLINGTON—NUMBER OF PERMITS, 47.

THIRTEENTH ANNUAL REPORT OF THE
BURLINGTON—CONTINUED.

CEDAR RAPIDS—NUMBER OF PERMITS. 62.

[illegible]

STATE DAIRY COMMISSIONER.

77

CLINTON—NUMBER OF PERMITS, 38.

COUNCIL BLUFFS—NUMBER OF PERMITS, 39.

79

DUBUQUE—NUMBER OF PERMITS, 56.

[illegible]

* July, 22.3; August, 16.1; September, 12.8; October, 19.5; November, 19.5; December, 19.5; January, 17.5; February, 20.3; March, 22.9; April, 19.9; May, 19.8; June, 17.1.

STATE DAIRY COMMISSIONER.

81

DES MOINES—CONTINUED.

**THIRTEENTH ANNUAL REPORT OF THE
FORT MADISON--NUMBER OF PERMITS, 17.**

KEOKUK--NUMBER OF PERMITS, 20.

MARSHALLTOWN--NUMBER OF PERMITS, 17.

MUSCATINE--NUMBER OF PERMITS, 19.

MUSCATINE—CONTINUED.

OTTUMWA—NUMBER OF PERMITS, 23.

* O. E. Martenson, cream only—April, 15.9; May, 15.4; June, 15.2.

† McOlurg & Son, cream only—April, 18.6; May, 21.9; June, 20.2.

SIOUX CITY—NUMBER OF PERMITS, 63.

RAILROAD BUTTER SHIPMENTS.

All the railroads of the state, with the exception of the Chicago, Milwaukee & St. Paul, have furnished the dairy commissioner with statistics of the number of pounds of butter shipped out of the state for the year ending October 1, 1899.

It will be noticed that these statistics are the later by five months than the statistics of the creamery make which are contained in this book. They, therefore, contain the shipments of the summer of '99, while the figures on the creamery make of butter contain the pounds of butter made in the summer of '98. It has been generally supposed that the report of butter shipments would fall far short of the total of last year. The figures this year are complete, with the exception noted above, and in making up the following tables the report of the Milwaukee for '98, less 1 per cent, was used. The total net decrease in butter shipments is practically nothing. By a study of the following tables, it will be seen, however, that there have been decreases in dairy counties amounting to over 5,000,000 pounds, which decrease is compensated for by astonishing increases in some counties which have not heretofore shipped an extraordinary amount of butter, notably Woodbury, Wayne and Clinton. The shipments from Woodbury are almost altogether from Sioux City, and are, no doubt, shipments of packed or reworked butter. It is not so easy to account for the increase in shipments in other counties. For instance, why should Buchanan have increased in butter shipments to the amount of 409,740 pounds, while Delaware decreased 182,810, Black Hawk decreased 221,618, Fayette decreased 181,797, and Linn decreased 22,754?

While the total butter shipments of the state as given in the following tables is approximately correct, the same cannot be said as to the showing of the different counties. That is, not all the butter made in a county is shipped from it. An example of the way injustice is unavoidably done certain counties is found in Grundy. This county has one railroad running

through its center, and four other roads lie just outside of the county lines or cut across the corners. Hence the counties surrounding Grundy are reported as shipping considerably more butter, of which a part, at least, is made in Grundy, but taken across the line to be shipped. There is no reasonable way to avoid this inaccuracy, and so the figures as furnished by the railroads are compiled as received.

The reports are received from the railroads in gross, and in estimating net butter shipments 16 per cent is subtracted from the gross pounds. The office is under great obligations to the different freight agents and auditors who have furnished the statistics.

TABLE No. 6.

Table showing total net butter shipments of the state for the years 1890 to 1899, inclusive, from Iowa to points outside the state; also increase or decrease as compared with the year preceding.

YEARS ENDING OCTOBER 1.	Net pounds of butter shipped.	Increase over pre- ceding year.	Decrease from pre- ceding year.
1890.....	71,255,796	.....	.....
1891.....	68,690,716	.....	2,565,080
1892.....	60,112,931	.....	8,577,785
1893.....	54,572,902	.....	5,540,029
1894.....	54,509,417	.....	63,485
1895.....	66,497,108	11,987,691	.....
1896.....	80,032,916	13,535,808	.....
1897.....	83,620,081	3,587,165	.....
1898.....	77,364,837	.....	6,255,244
1899.....	77,013,875	.....	350,462

TABLE NO. 7.

COUNTIES.	NUMBER OF CREAMERIES FOR 1898 AND 1899, WITH INCREASE AND DECREASE.				GROSS POUNDS OF BUTTER SHIPPED OUT OF THE STATE FOR THE YEARS ENDING SEPTEMBER 30, 1898 AND 1899, SHOWING INCREASE AND DECREASE BY COUNTIES.			
	1898.	1899.	Increase.	Decrease.	1898.	1899.	Increase.	Decrease.
The state	954	987	33	79	92,099,311	1	5,153,180	5,593,457
Adair	13	12	1	1	598,895	23	7,097	7,097
Adams	7	7	0	0	664,512	23	17,980	17,980
Allamakee	9	11	2	1	1,900,994	15	36,011	36,011
Appanoose	11	11	0	0	933,798	41	12,290	12,290
Audubon	13	14	1	0	959,225	26	218,403	218,403
Benton	13	19	6	0	2,177,997	79	51,301	51,301
Black Hawk	8	8	0	0	163,339	74	48,165	48,165
Boone	26	24	2	2	2,279,855	35	268,771	268,771
Bremer	17	18	1	0	9,959,480	21	199,700	199,700
Buchanan	9	10	1	0	1,357,373	26	203,777	203,777
Buena Vista	22	22	0	0	3,135,764	18	517,661	517,661
Butler	11	7	4	4	1,333,140	41	83,399	83,399
Calhoun	13	13	0	0	991,537	13	6,124	6,124
Carroll	7	7	0	0	514,465	77	135,488	135,488
Cass	10	11	1	1	801,401	64	68,063	68,063
Cedar	12	9	3	3	1,637,073	30	144,523	144,523
Cerro Gordo	9	10	1	0	476,616	26	137,826	137,826
Cherokee	20	21	1	0	2,913,468	25	190,130	190,130
Chickasaw	5	6	1	0	945,398	74	2,456	2,456
Clarke	9	9	0	0	307,677	80	8,867	8,867
Clay	20	21	1	0	3,049,974	80	30,494	30,494
Clayton	14	14	0	0	644,925	26	517,711	517,711
Clinton	8	8	0	0	333,306	25	32,563	32,563
Crawford	11	14	3	0	735,245	15	3,570	3,570
Dallas	4	4	0	0	35	28	31,131	31,131
Davis	3	4	1	0	34	28	120,706	120,706
Decatur	31	28	3	3	60	60	182,310	182,310
Delaware	4	4	0	0	70	70	140,906	140,906
Des Moines	23	23	0	0	50	50	112,665	112,665
Dickinson	6	7	1	0	31	21	153,910	153,910
Dubuque	23	22	1	2	30	30	36,000	36,000
Emmet	7	7	0	0	19	19	191,797	191,797
Fayette	23	22	1	2	19	19	9,990	9,990
Floyd	7	7	0	0	50	50	43,000	43,000
Franklin	11	11	0	0	30	30	1,694	1,694
Fremont	9	9	0	0	40	40	55,306	55,306
Greene	19	17	2	2	10	10	106,964	106,964
Grundy	12	14	2	0	16	16	349,251	349,251
Guthrie	13	13	0	0	14	13	137,301	137,301
Hamilton	11	11	0	0	13	13	23,128	23,128
Hancock	15	14	1	1	59	52	137,163	137,163
Hardin	4	5	1	0	78	65	53,753	53,753
Harrison	4	3	1	1	58	48	65,630	65,630
Henry	9	9	0	0	13	30	9,318	9,318
Howard	9	11	2	0	31	31	13,247	13,247
Humboldt	5	5	0	0	60	60	63,048	63,048
Ida	6	5	1	1	38	38	33,023	33,023
Iowa	19	22	3	2	55	55	66,913	66,913
Jackson	8	10	2	0	70	70	25,287	25,287
Jasper	9	6	3	3	26	79	65,447	65,447
Jefferson	8	9	1	0	78	54	97,034	97,034
Johnson	30	29	1	1	55	54	180,801	180,801
Jones	3	3	0	0	73	68	33,165	33,165
Keokuk	21	21	0	0	30	30	4,070	4,070
Kossuth	1	1	0	0	17	31	276,304	276,304
Lee	20	20	0	0	70	23	23,754	23,754
Linn	3	3	0	0	30	10	26,970	26,970
Louis	1	2	1	0	16	11	27,705	27,705
Lucas	4	3	1	1	28	58	11,761	11,761
Lyon	4	3	1	1	15	35	47,670	47,670
Madison	1	1	0	0	50	50	408,665	408,665
Mahaska	3	3	0	0	15	30	11,125	11,125
Marion	11	12	1	0	32	23	45,000	45,000
Marshall	4	3	1	1	17	28	20,913	20,913

TABLE No. 7—CONTINUED.

COUNTIES.	NUMBER OF CREAMERIES FOR 1898 AND 1899, WITH IN- CREASE AND DECREASE.				GROSS POUNDS OF BUTTER SHIPPED OUT OF THE STATE FOR THE YEAR ENDING SEPTEMBER 30, 1898 AND 1899, SHOWING INCREASE AND DECREASE BY COUNTIES.			
	1898.	1899.	Increase.	Decrease.	1898.	1899.	Increase.	Decrease.
Mitchell.....	9	10	1	..	1,886,208	89	..	8,419
Monona.....	1	1	..	..	68,277	80	..	63,217
Monroe.....	1	1	..	..	20,400	85	2,128	..
Montgomery.....	3	3	1	1	258,254	73	147,808	..
Muscataine.....	5	5	1	1	291,915	68	..	77,428
O'Brien.....	6	6	..	..	637,580	85	..	115,885
Osceola.....	1	2	2	1	248,428	20	..	198,888
Pack.....	6	7	1	..	214,538	34	..	4,984
Palo Alto.....	17	18	1	..	2,308,062	80	..	247,473
Plymouth.....	11	11	1	1	868,307	40	..	186,287
Pocahontas.....	9	12	3	2	283,888	61	72,000	..
Polk.....	8	7	1	2	208,754	80	..	2,164
Pottawattamie.....	5	6	1	..	694,412	60	..	120,432
Poweshiek.....	6	8	2	..	164,333	39	..	86,196
Ringgold.....	3	3	..	..	124,849	50	..	2,889
Sac.....	13	15	2	1	1,418,307	84	..	168,473
Scott.....	2	2	..	..	..	76	..	5,382
Shelby.....	8	9	1	..	64	66	26,762	..
Sioux.....	2	10	8	..	74	14	..	31,580
Story.....	15	15	1	1	15	84	..	66,581
Tama.....	11	11	1	1	89	93	..	23,394
Taylor.....	6	6	..	..	62	76	83,873	..
Union.....	14	14	..	..	2	74	..	115,888
Van Buren.....	4	4	1	1	67	85	29,778	..
Wapello.....	4	4	1	1	60	61	..	108,689
Warren.....	6	6	1	1	90	80	..	19,810
Washington.....	6	6	..	..	36	70	61,675	..
Wayne.....	3	3	..	2	76	78	421,702	..
Webster.....	9	12	3	..	77	97	126,990	..
Winnebago.....	15	15	1	1	63	68	..	26,212
Winneshiek.....	17	13	1	4	78	61	43,202	..
Woodbury.....	9	7	1	2	81	66	1,179,184	..
Worth.....	9	11	2	..	68	78	..	27,970
Wright.....	11	12	1	..	63	19	5,066	..
The state.....	954	967	95	79	92,099,211	91,683,184	5,266,206	5,466,467

Actual total decrease in butter shipments, 416,098.

TABLE No. 8.

NET BUTTER SHIPMENTS BY COUNTIES AND RANK—AREA OF COUNTIES.

Showing pounds of butter shipped per square mile and rank of counties; also total net butter shipments for the state and net pounds per square mile, for the year ending September 30, 1899.

					Rank by lbs. per square mile.
The state.....	75	56,985	1,373	...	...
Adair.....	80	54	778	652	84
Adams.....	04	81	482	1,313	39
Allamakee.....	87	21	668	1,615	23
Appanoose.....	16	06	516	80	98
Audubon.....	58	39	443	2,123	19
Benton.....	17	30	730	1,051	50
Black Hawk.....	58	16	578	2,853	15
Boone.....	06	76	578	309	77
Bremer.....	51	8	432	5,905	1
Buchanan.....	45	1	578	4,913	2
Buena Vista.....	81	27	578	1,664	30
Butler.....	95	8	578	3,819	7
Calhoun.....	02	28	578	1,541	32
Carroll.....	47	26	578	1,437	35
Cass.....	81	63	578	703	62
Cedar.....	70	41	578	1,365	41
Cerro Gordo.....	08	30	578	2,103	23
Cherokee.....	82	08	578	509	68
Chickasaw.....	72	5	504	5,006	3
Clarke.....	17	72	428	423	70
Clay.....	50	50	578	1,166	44
Clayton.....	53	4	736	4,904	4
Clinton.....	14	26	698	1,399	26
Crawford.....	17	08	720	408	72
Dallas.....	05	45	568	1,137	46
Davis.....	84	84	608	311	83
Decatur.....	06	31	584	162	93
Delaware.....	72	6	578	4,165	5
Des Moines.....	01	80	415	288	78
Dickinson.....	76	86	404	1,123	45
Dubuque.....	80	10	601	2,323	10
Emmet.....	79	02	494	1,130	47
Fayette.....	00	7	730	2,129	12
Floyd.....	02	44	504	1,336	38
Franklin.....	02	45	575	1,122	46
Fremont.....	55	09	509	4	99
Greene.....	83	22	578	1,872	25
Grundy.....	87	26	504	1,322	31
Guthrie.....	52	28	593	1,312	48
Hamilton.....	86	15	578	2,863	14
Hancock.....	82	05	578	642	66
Hardin.....	86	14	578	2,895	13
Harrison.....	55	62	606	185	95
Henry.....	18	90	423	137	96
Howard.....	87	21	478	2,429	17
Humboldt.....	00	22	428	2,078	24
Ia.....	50	03	423	902	52
Iowa.....	16	89	584	779	59
Jackson.....	81	23	688	1,467	24
Jasper.....	56	04	730	339	67
Jefferson.....	86	71	423	550	56
Johnson.....	01	26	618	145	97
Jones.....	92	2	578	4,645	6
Keokuk.....	15	79	578	250	81
Kossuth.....	80	12	977	1,757	29
Lee.....	84	55	512	976	54
Linn.....	08	19	730	2,012	25
Louis.....	72	97	407	123	91

TABLE No. 8—CONTINUED.

COUNTIES.	Total net shipments of butter for the year.	Rank by total lbs. shipped.	Area of square miles in counties.	Pounds per square mile.	Rank by lbs. per square mile.
Lucas...	60,069	89	422	141	88
Lyon...	260,869	70	587	437	71
Madison...	75,814	87	576	122	90
Mahaska...	226,178	72	576	375	74
Marion...	115,937	81	576	201	83
Marshall...	684,820	43	576	1,189	42
Mills...	43,284	93	441	97	94
Mitchell...	1,579,863	17	473	2,340	11
Monona...	19,370	96	556	35	97
Monroe...	18,921	97	432	44	95
Montgomery...	341,118	67	432	790	58
Muscatine...	160,149	74	437	412	72
O'Brien...	429,764	61	576	746	61
Osceola...	39,337	94	400	98	93
Page...	176,093	77	557	316	76
Palo Alto...	2,150,887	9	576	2,734	8
Plymouth...	627,934	49	860	730	62
Pocahontas...	803,788	37	576	1,395	37
Polk...	166,816	78	585	285	79
Pottawattamie...	476,244	56	960	496	69
Poweshiek...	387,197	66	382	961	55
Ringgold...	102,018	85	542	188	84
Sac...	1,065,821	24	576	1,850	27
Scott...	114,222	83	455	251	80
Shelby...	455,007	60	590	771	60
Sioux...	749,460	40	769	949	56
Story...	1,669,403	13	576	2,204	18
Tama...	707,956	42	720	963	53
Taylor...	178,336	75	548	325	75
Union...	942,895	31	432	2,182	20
Van Buren...	69,749	88	484	146	96
Wapello...	470,200	57	432	1,089	49
Warren...	31,903	95	669	56	96
Washington...	564,539	52	566	997	51
Wayne...	628,386	47	523	1,201	43
Webster...	633,164	46	720	879	57
Winnebago...	1,070,273	23	403	2,656	16
Winneshiek...	1,536,260	18	694	2,113	21
Woodbury...	1,925,503	11	573	3,360	9
Worth...	845,022	34	403	2,102	23
Wright...	957,701	30	576	1,659	30
Total	77,013,875		56,025	1,373	....

TABLE No. 9.

Showing twenty leading counties, according to rank in net shipments of butter per square mile; also net pounds shipped per square mile; also showing rank of same counties and shipments per square mile for preceding year.

Following is a table showing the twenty counties from which the greatest number of pounds of butter is shipped, and comparison with number of pounds shipped from each in previous period; the year ends October 1st of each year, figures given being for net shipments:

TABLE No. 10.

COUNTIES.	1899.		1898.	
	Rank.	Pounds.	Rank.	Pounds.
Buchanan.....	1	45	6	2,485,963
Jones.....	2	48	1	2,389,306
Bremer.....	3	51	2	2,747,519
Clayton.....	4	68	4	2,561,978
Chickasaw.....	5	72	8	2,363,263
Delaware.....	6	72	5	2,546,718
Fayette.....	7	60	7	2,412,106
Butler.....	8	95	3	2,634,898
Palo Alto.....	9	87	9	2,358,764
Dubuque.....	10	30	10	2,227,674
Woodbury.....	11	68	20	936,000
Kossuth.....	12	80	14	1,719,696
Story.....	13	68	12	1,728,037
Hardin.....	14	96	16	1,562,870
Hamilton.....	15	26	18	1,736,366
Black Hawk.....	16	66	11	1,892,518
Mitchell.....	17	62	15	1,684,925
Winnebago.....	18	80	17	1,600,810
Linn.....	19	68	18	1,472,419
Cerro Gordo.....	20	68	19	1,233,141
Total.....		40,106,807		40,581,768

It will be noticed that the above counties, leaving out Woodbury, are the same nineteen counties that ranked first last year, but in different order. Also that there is a decrease in the amount of butter shipped from the twenty counties of 389,496 pounds, which is more than the total net decrease of the state. In the above list Woodbury, which is not a creamery county, shows a gain of nearly 1,000,000 pounds. Leaving out Woodbury, the nineteen chief dairy counties show a decrease of about 1,875,000 pounds, which is nearly compensated for by increases in counties not counted as being accustomed to ship large quantities of butter.

CREAMERY LIST.

List of creameries in the state, alphabetically arranged according to counties and town near which creamery is located, together with information pertaining to each.

Office record number.	LOCATED AT OR NEAR.	NAME OF CREAMERY.	Operated by an individual, co-operative, or stock company.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF BUTTER-MAKER.	Separator, Rath-bottles, or both.	Method of receiving milk—by the test or by the hundred.	No. of D. O. test bottle.	No. of D. O. petite.
<i>Adair County.</i>											
1	Adair.....	Elgin Creamery Co. (s).....	Ind	O Sands, Pres.....	Chicago, Ill ..	.....	.....	Sep'tr ..	Test ..	1361	409
2	Arbor Hill.....	Hebron Creamery Co. (s).....	Ind	A. R. Haskell	Hebron.....	Orient .....	.....	Sep'tr ..	Test ..	1361	409
3	Berea	Blue Grass Or'y Co. (s).....	Ind	A. L. Stewart & Co.....	Fontanelle ..	.....	.....	Sep'tr ..	Hd.	1017	304
4	Bridgewater...	Blue Grass Or'y Co	Ind	A. L. Stewart & Co.....	Fontanelle ..	Bridgewater ..	.....	Sep'tr ..	Hd.	1017	304
5	Canby	Blue Grass Or'y Co. (s).....	Ind	A. L. Stewart & Co.....	Fontanelle ..	Fontanelle .....	.....	Sep'tr ..	Hd.	1017	304
6	Fontanelle.....	Blue Grass Or'y Co	Ind	A. L. Stewart & Co.....	Fontanelle ..	Fontanelle .....	.....	Sep'tr ..	Hd.	1017	304
7	Greenfield	Blue Grass Or'y Co	Ind	A. L. Stewart & Co.....	Fontanelle ..	Fontanelle .....	.....	Sep'tr ..	Hd.	1017	304
8	Hebron.....	Hebron Creamery Co.....	Ind	A. E. Haskell.....	Greenfield ..	Greenfield .....	.....	Sep'tr ..	Hd.	1017	304
9	Holiday	Elgin Creamery Co. (s).....	Ind	O Sands, Pres.	Hebron	Orient .....	.....	Sep'tr ..	Test ..	1361	409
10	Howe	Howe Co-op. Or'y Co.....	Co-op	A. C. Ourtis	Chicago, Ill.....	.....	.....	Sep'tr ..	Test ..	1361	409
11	Orient.....	Elgin Creamery Co. (s).....	Ind	O Sands, Pres.....	Menlo	Stuart .....	.....	Sep'tr ..	Test ..	1361	409
12	Richland.....	Blue Grass Or'y Co. (s).....	Ind	A. L. Stewart & Co.....	Chicago, Ill.....	.....	.....	Sep'tr ..	Test ..	1361	409
<i>Adams County.</i>											
13	Corning	Elgin Creamery Co	Ind	O Sands, Pres.....	Chicago, Ill.....	Corning .....	.....	Sep'tr ..	Test ..	1451	407
14	Carbon.....	Elgin Creamery Co. (s).....	Ind	O Sands, Pres.....	Chicago, Ill.....	.....	.....	Sep'tr ..	Test ..	1451	407

STATE DAIRY COMMISSIONER.

15	Carl.....	Ind...	O. Sands, Pres.	Chicago, Ill.	.....	.....	.....	Test.	1897
16	Merces.....	Ind...	O. Sands, Pres.	Chicago, Ill.	.....	.....	.....	Test.	
17	Podaway.....	Ind...	O. Sands, Pres.	Chicago, Ill.	.....	.....	.....	Test.	
18	Prescott.....	Co-op.	W. H. Grammer, Pres.	Prescott.	.....	.....	O. E. Chicago	Test.	
19	Williamson.....	Co-op.	W. H. Grammer, Pres.	Prescott.	.....	.....	.....	Test.	
Allamakee County									
20	Dorchester.....	8th Co	I. Coppersmith, Mgr	Dorchester	.....	New Albin	H. J. Foss	Test.	
21	Landing.....	Co-op	J. Leppert, Sec.	Church.....	Landing.....	.....	George Turner	Test.	
22	Ladlow.....	Co-op	S. H. Opler, Sec.	Waukon.....	Postville.....	Postville.....	Jan. A. Gordon	Test.	
23	Postville.....	Co-op	R. H. Weber, Sec.	Waukon.....	Postville.....	Postville.....	.....	Test.	
24	Boesville.....	Co-op.	S. H. Opler, Sec.	Waukon.....	Postville.....	Postville.....	.....	Test.	
25	Quandahl.....	Ind...	I. D. Johnson.....	Quandahl	Spring Grove	Spring Grove	I. Langlie	Test.	
26	Village Creek.	Co-op.	A. J. McGafferty, Sec	Landing..	Landing.....	Landing.....	E. Baumann.	Test.	
27	Waterville.....	Co-op	Adolph Aulseon, Sec	Waterville.	Waterville.	Waterville.	A. Aulseon	Test.	
28	Waukon.....	Co-op	S. H. Opler, Sec.	Waukon.....	Waukon.....	Waukon.....	.....	Test.	
29	Waukon.....	Co-op.	A. G. Winter, Sec.	Waukon.....	Waukon.....	Waukon.....	Fred Nagel	Test.	1900
30	Waterville.....	Co-op.	S. H. Opler, Sec.	Waukon.....	Waukon.....	Waukon.....	P. A. Plot	Test.	
Audubon County									
31	Audubon.....	Co-op.	J. R. Christensen, Sec	Audubon.	Audubon.	Audubon.	M. Andersen.	Test.	
32	Audubon.....	Co op	Peter Lykke, Sec.	Kimballton	Audubon.	Audubon.	O. F. Jensen.	Test.	
33	Brayton.....	Co-op.	J. Nymand, Sec.	Brayton.	Brayton.	Brayton.	H. Heuricksen	Test.	1196 124
34	Brayton.....	Co-op.	J. Q. Hardman, Sec.	Brayton	Brayton	Brayton	J. P. Nielson	Test.	1258 265
35	Exira.....	Ind...	O. Sands, Pres.	Chicago, Ill.	Exira.....	Exira.....	H. P. Petersen.	Test.	1438 261
36	Exira.....	Co-op.	H. P. Petersen, Sec.	Exira.....	Exira.....	Exira.....	.....	Test.	
37	Exira.....	Co-op.	John Nielsen	Exira.....	Exira.....	Exira.....	John Nielsen	Test.	
38	Gray.....	Co-op.	Louis Groelunshen.	Gray.....	Gray.....	Gray.....	M. J. Goodnow	Test.	1316 254
39	Hamlin.....	Co-op.	H. G. Rice, Sec	Hamlin	Hamlin.	Hamlin.	F. Heileman.	Test.	1012 104
40	Ross Creamery	Co-op.	H. W. Stearns, Sec.	Audubon.	Ross.....	Ross.....	Jan. Smith.....	Test.	1400 249
41	Ross Creamery Co. (e)...	Co-op.	J. Shingledecker, Sec	Audubon.	Audubon.	Audubon.	.....	Test.	
Benton County									
42	Atkins.....	Co-op.	R. Simmer.....	Atkins	Atkins	Atkins	V. Knaf	Hd	
43	Fremont Creamery	Ind.	John Newman Co	Exira, Id.	Belle Plaine	Belle Plaine	Q. W. Hicks	Test.	
44	Springbrook	Ind.	J. A. Daucalif	Blairstown	Blairstown	Blairstown	K. A. Daucalif.	Test.	
45	Katie's Creamery	Co-op.	.....	Blairstown	Blairstown	Blairstown	.....	Test.	
46	Co. Auburn Co-op. Or'y	Co-op.	N. Schaeor, Sec	Mt. Auburn	Mt. Auburn	Mt. Auburn	J. S. Smith.	Test.	1280 291

CREAMERY LIST—CONTINUED.

Office record number.	LOCATED AT OR NEAR.	NAME OF CREAMERY.	Owned by an individual or stock company.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF BUTTER-MAKER.	Separator, bath or both.	Method of receiving milk or by the hundred.	No. of D. O. test.	No. of D. O. bottle.
46	Gillespie.	La Porte Co-op. Cr'y Co. (s)	Co-op.	C. B. Glasgish, Sec.	La Porte.	Norway.	Wm Rowe	Sep'tr.	Test.		
47	Norway	Norway Creamery	Ind.		Norway.	Shellsburg.		Sep'tr.	Test.		
48	Shellsburg		Ind.		Shellsburg.			Sep'tr.	Test.		
49	Shellsburg		Ind.		Shellsburg.			Sep'tr.	Test.		
50	Shellsburg		Ind.		Shellsburg.			Sep'tr.	Test.		
51	Van Horn		Co-op.		Van Horn.	Center Point.	Wilton Briggs	Sep'tr.	Test.		197
52	Van Horn		Co-op.		Van Horn.	Center Point.	Katie A. Wick	Sep'tr.	Test.		433
53	Vinton		Ind.		Vinton.	Van Horn	Geo H. Gray	Sep'tr.	Test.		438
54	Vinton		Ind.		Vinton.	Vinton.	Homer Barber	Sep'tr.	Test.		494
55	Watkins	Watkins Creamery	Ind.	E. S. McDonald	Watkins.	Watkins.	E. S. McDonald	Sep'tr.	Test.		226
Black Hawk County.											
56	Benson	Benson Dairy Co.	Co-op.	Wm. Morgan, Sec.	Benson.	Benson	Geo. W. Thayer	Sep'tr.	Test.		270
57	Cedar Falls	Cedar Falls Co-op. Cr'y Co. (s)	Co-op.	L. A. Saverin, Sec.	Cedar Falls.	Cedar Falls.	A. K. Smith	Sep'tr.	Test.		72
58	Grain Creek	Grain Creek Creamery	Ind.	S. A. Riedel, Prop.	Grain Creek.	Grain Creek.	S. A. Riedel	Sep'tr.	Test.		83
59	De War	De War Dairy Ass'n	Co-op.	G. E. Kieckhefer, Sec.	De War.	De War.	Wm. McKen	Sep'tr.	Test.		83
60	Dunkerton	Dunkerton Cr'y Co. (s)	Co-op.	Rogers & Miller.	Dunkerton.	Dunkerton.	O. G. Alexander	Sep'tr.	Test.		124
61	Dunkerton		Ind.	J. J. Humphrey, Sec.	Dunkerton.	Dunkerton.	Isiah Hill	Sep'tr.	Test.		285
62	Edwards		Ind.	J. O. Wilson, Sec.	Edwards.	Edwards.	I. R. Hies	Sep'tr.	Test.		285
63	Fairbank		Co-op.	J. A. Briggs, Sec.	Fairbank.	Fairbank.	I. R. Hies	Sep'tr.	Test.		285
64	Fairbank		Co-op.	J. E. Kaseha, Sec.	Fairbank.	Fairbank.	C. E. Fuller	Sep'tr.	Test.		285
65	Gilbertville		Co-op.	W. P. Thompson, Sec.	Gilbertville.	Washburn.	Thos. Hansen	Sep'tr.	Test.		285
66	Hudson		Co-op.	G. H. Brandhorst	Hudson.	Hudson.	G. P. Strayer	Sep'tr.	Test.		285
67	Hudson		Co-op.	H. G. Koch, Sec.	Hudson.	Hudson.	G. P. Strayer	Sep'tr.	Test.		285
68	Jubilee		Co-op.	J. E. Randon, Sec.	Jubilee.	Jubilee.	M. J. Johnson	Sep'tr.	Test.		285
69	Jubilee		Co-op.	C. E. Glasgish, Sec.	Jubilee.	Jubilee.	Occat Harvey	Sep'tr.	Test.		285
70	La Porte	La Porte Co-op. Cr'y Co. (s)	Co-op.	Engelking & Widen	La Porte.	La Porte.	Engelking & Widen	Sep'tr.	Test.		285
71	Waterloo	Waterloo Creamery	Ind.	The Fowler Co.	Waterloo.	Waterloo.	F. W. Widen	Sep'tr.	Test.		285
72	Waterloo	North Star	Ind.	The Fowler Co.	Waterloo.	Waterloo.	Chas. Wood	Sep'tr.	Test.		285

STATE DAIRY COMMISSIONER.

97

74	Waterloo.....	Co-op.	Waterloo.....	Waterloo.....	Sep'tr..	Test.
	Boone County					
75	Beaver.....	Ind...	Beaver.....	Beaver.....	S. & G.O.	Test.
76	Boone.....	Ind...	Boone.....	Boone.....	Sep'tr..	Test.
77	Benton.....	Ind...	Benton.....	Benton.....	Sep'tr..	Test.
78	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
79	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
80	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
81	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
82	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
83	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
84	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
85	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
86	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
87	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
88	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
89	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
90	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
91	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
92	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
93	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
94	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
95	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
96	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
97	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
98	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
99	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
100	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
101	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
102	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
103	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
104	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
105	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
106	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
107	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
108	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
109	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.
110	Madrid.....	Ind...	Madrid.....	Madrid.....	Sep'tr..	Test.

*Manufacture butter and cheese.

CREAMERY LIST—CONTINUED.

Office record number.	LOCATED AT OR NEAR.	NAME OF ORG.	OPERATED BY AS INDIVIDUAL, CO- OP OR STOCK COMPANY.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF BUTTER-MAKER.	Separator, Fat- both.	Method of recel- ing milk—by the test or by the hundred.	No. of U. C. test bottle.	No. of D. O. pl- bottle.
111	Independence.	Independence Cr'y.	Ind.	Weiss & Skilling, Sec.	Independence.	Independence.	.....	Sep'tr.	Test.	10	
112	Jesup.	Jesup.	Co-op.	James Dalton, Sec.	Jesup.	Jesup.	A. Christensen	Sep'tr.	Test.		
113	Jesup.	Jesup.	Stk Co.	.....	Jesup.	Jesup.	.....	G. O.	Test.		
114	Lamont.	Lamont.	Co-op.	.....	Vista.	Lamont.	F. Kleckner	Sep'tr.	Test.	223	
115	Ottaville.	Ottaville.	Co-op.	.....	Ottaville.	Independence.	Martin Yundt	Sep'tr.	Test.		
116	Quasqueton.	Quasqueton.	Ind.	.....	Winthrop.	Rowley.	John Polan	Sep'tr.	Test.		
117	Rowley.	Rowley.	Co-op.	.....	Lamont.	Rowley.	Frank Strong	Sep'tr.	Test.		
118	Stanley.	Stanley.	Ind.	.....	Winthrop.	Independence.	L. O. Barker	Sep'tr.	Test.		
119	Walker.	Walker.	Co-op.	.....	Walker.	Walker.	E. J. Ford	G. O.	Test.		
120	Winthrop.	Winthrop Creamery.	Ind.	.....	Winthrop.	Winthrop.	W. H. Plank	Sep'tr.	Test.	87	
121	Winthrop.	Gold Coin Creamery.	Ind.	.....	Winthrop.	Winthrop.	D. E. Conlin	Sep'tr.	Test.	143	
122	Winthrop.	Winthrop Creamery Co.	Ind.	John Hazelrigg, Pr.	Middlefield.	Winthrop.	M. O. Hazelrigg	Sep'tr.	Test.		
<i>Burns Valley County.</i>											
123	Alta.	Alta Creamery.	Ind.	G. P. Cornelissen, Pr.	Alta.	Alta.	W. H. Ollas	Sep'tr.	Test.	420	
124	Marathon.	Marathon.	Co-op.	E. R. Stangland, Sec.	Marathon.	Marathon.	P. O. Lindstrom	Sep'tr.	Test.	113	
125	Marathon.	Marathon.	Co-op.	O. G. England, Sec.	Marathon.	Marathon.	G. P. Langquist	Sep'tr.	Test.	143	
126	Newell.	Newell.	Stk Co.	E. W. Stewen	Newell.	Newell.	P. C. Flasket, rd	Sep'tr.	Test.	274	
127	Peterson.	Peterson.	Ind.	Hane O. Kruse, Sec.	Newell.	Peterson.	O. H. Jordan	Sep'tr.	Test.	171	
128	Sturm Rapids.	Sturm Rapids.	Ind.	W. R. Montgomery, Pr.	Peterson.	Sturm Rapids.	A. D. Peck	Sep'tr.	Test.	171	
129	Sturm Lake.	Sturm Lake.	Ind.	McKay & Sosake.	Sturm Lake.	Sturm Lake.	John Linge	Sep'tr.	Test.	...	
130	Sulphur Sprgs.	Sulphur Sprgs.	Ind.	Henry Hustedt	Fonda.	Fonda.	.....	Sep'tr.	Test.	...	
131	Sulphur Sprgs.	Sulphur Sprgs.	Ind.	R. F. Bewick, Prop.	Fonda.	Fonda.	.....	Sep'tr.	Test.	...	
132	Sulphur Sprgs.	Sulphur Sprgs.	Co-op.	O. G. England, Sec.	Marathon.	Marathon.	.....	Sep'tr.	Test.	...	
133	Fairfield Cr'y Co. (a).	Fairfield Cr'y Co. (a).	Co-op.	.....	Marathon.	Marathon.	.....	Sep'tr.	Test.	...	
<i>Butler County.</i>											
134	Applington.	Applington.	Stk Co.	H. Patterson	Applington.	Applington.	H. Patterson	Sep'tr.	Test.	818	
135	Applington.	Applington.	Co-op.	A. Ontjes	Applington.	Applington.	Wm. Lentus	Sep'tr.	Test.	...	
136	Austinville.	Austinville.	Ind.	G. Patterson	Austinville.	Austinville.	S. Patterson	Sep'tr.	Test.	...	
137	Austinville.	Austinville.	Stk Co.	T. L. Laird, Sec.	Dumont.	Austinville.	.....	Sep'tr.	Test.	...	
138	Aradale.	Aradale.	Co-op.	M. G. Hull	Bristow.	Bristow.	Edwin Rector	Sep'tr.	Test.	49	228
139	Bristow.	Bristow.	Ind.	James P. Johnston.	Bristow.	Bristow.	J. P. Johnston	Sep'tr.	Test.	1441	300
140	Bristow.	Bristow.	Ind.	.....	Hitsville.	Bristow.	.....	Sep'tr.	Test.	...	

141	Butler Center.	Ind.	W. J. Daniels.	Butler Center.	Allison.	W. J. Daniels.	Rep'tr.	Test.	1233	206
142	Clarkson.	Stk Co	E. D. Wilson.	Clarksville.	Clarksville.	W. E. Barkley.	S & G.C.	Test.	1163	446
143	Coater.	Ind.	Ed Olsen.	Coater.	Shell Rock.	Ed Olsen.	Rep'tr.	Test.		
144	Dumont.	Co-op.	A. E. Harsem.	Clatsville.	Dumont.	Wm. Kurtz.	Rep'tr.	Test.		
145	Dumont.	Stk Co	T. F. Lard & Co.	Dumont.	Dumont.	John Carlson.	Rep'tr.	Test.	118	146
146	Greene.									
147	Greene.	Stk Co	O. S. Randall.	Greene.	Greene.	L. J. Sargent.	S & G.C.	Test.	1424	232
148	New Hartford.	Ind.	H. Dehaer, Sec.	Greene.	Greene.	F'm'n Ladage.	Rep'tr.	Test.	1386	311
149	New Hartford.	Co-op.		New Hartford.	New Hartford.	J. A. Ranney.	Rep'tr.	Test.	1386	311
150	Parkersburg.	Co-op.		Parkersburg.	Parkersburg.	George Palmer.	Rep'tr.	Test.	1180	81
151	Parkersburg.	Co-op.		Parkersburg.	Parkersburg.	A. J. Gradland.	Rep'tr.	Test.	702	377
152	Prosper.	Stk Co		Prosper.	Prosper.	O. O. Towne.	Rep'tr.	Test.	82	180
153	Shell Rock.	Co-op.		Shell Rock.	Shell Rock.	Franklin Reel.	Rep'tr.	Test.	1506	436
154	Shell Rock.	Co-op.		Shell Rock.	Shell Rock.	O. O. Towne.	Rep'tr.	Test.	1182	360
155	Swanton.	Co-op.		Swanton.	Swanton.	W. E. Woodcock.	Rep'tr.	Test.	1237	206
156	Shell Rock.	Co-op.	J. M. Oasa, Sec.	Waverly.	New Hartford.		Rep'tr.	Test.		
Cathow County										
157	Churdan.	Ind.	Benner Bros.	Grand Junction.			Rep'tr.	Test.		
158	Churdan.	Ind.	Parker & Fitzsimons.	Grand Junction.			Rep'tr.	Test.		
159	Fonda.	Ind.	R. F. Bewick.	Fonda.	Fonda.		Rep'tr.	Test.		
160	Lohrville.	Ind.	Benner Bros.	Grand Junction.	Manson.	G. B. Moon.	Rep'tr.	Test.		
161	Manson.	Ind.	G. B. Moon.	Manson.	Manson.		Rep'tr.	Test.		
162	Pomeroy.	Ind.					Rep'tr.	Test.		
163	Pomeroy.	Co-op.	H. A. Albrecht, Sec.	Pomeroy.	Kaoko.	E. E. Dodge.	Rep'tr.	Test.	1171	55
164	Pomeroy.	Co-op.	John Behrend, Sec.	Pomeroy.	Pomeroy.	E. F. Haven.	Rep'tr.	Test.	1276	238
Carroll County										
164	Arcadia.	Co-op.	H. H. Stevens, Sec.	Arcadia.	Arcadia.	Stephen Jans.	Rep'tr.	Test.	1337	735
165	Breda.	Ind.	Ed Rehker, Sec.	Arcadia.	Arcadia.	W. H. Hines.	Rep'tr.	Test.	1038	247
166	Coon Rapids.	Ind.	H. L. Fest.	Coon Rapids.	Dedham.	H. L. Fest.	Rep'tr.	Test.	1037	246
167	Dedham.	Ind.	H. L. Fest.	Coon Rapids.	Dedham.	W. B. White.	Rep'tr.	Test.	1337	451
168	Dedham.	Ind.	A. White.	Willow.	Dedham.	Oarl Hems.	Rep'tr.	Test.	1337	451
169	Glidden.	Ind.	Carl Heese.	Glidden.	Glidden.		Rep'tr.	Test.	1337	451
170	Halbur.	Ind.	J. T. Stangel.	Halbur.	Halbur.		Rep'tr.	Test.	1337	451
171	Halbur.	Ind.	J. T. Stangel.	Halbur.	Halbur.		Rep'tr.	Test.	1337	451
172	Halbur.	Ind.	W. P. Miller, Prop.	Halbur.	Halbur.	W. P. Miller.	Rep'tr.	Test.	1337	451
173	Mt. Carmel.	Ind.	Ed Rehker.	Arcadia.	Manning.	W. H. Hines.	Rep'tr.	Test.	1337	451
174	Roselle.	Ind.	A. E. Adams.	Roselle.	Roselle.	O. Koborn.	Rep'tr.	Test.	1337	451
175	Roselle.	Ind.	O. Koborn.	Roselle.	Halbur.	O. Koborn.	Rep'tr.	Test.	1337	451
176	Templeton.	Stk Co	George Bieri.	Templeton.	Templeton.	M. Wagner.	Rep'tr.	Test.	1337	451
Cass County										
177	Atlantic.	Ind.	O. Sanda, Pres.	Chicago, Ill.	Atlantic.	P. Williams.	Rep'tr.	Test.	1450	405
178	Beaton Center.	Ind.	O. Sanda, Pres.	Chicago, Ill.	Atlantic.	P. Williams.	Rep'tr.	Test.	1450	405

CREAMERY LIST—CONTINUED.

O. No. record	LOCATED AT OR NEAR.	NAME OF CREAMERY.	Owned by an individual, co-operative or stock company.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF BUTTER-MAKER.	Separator, sketched cream, or both.	Method of receiving milk—by test or by the hundred.	No. of D. O. tests	No. of D. O. bottles.
179	Lewis	Elgin Creamery Co. (s)	Ind	O. Sands, Pres.	Chicago, Ill.			Sep'tr	Test.		
180	Lyman	Elgin Creamery Co. (s)	Ind	O. Sands, Pres.	Chicago, Ill.			Sep'tr	Test.		
181	Marne	Elgin Creamery Co. (s)	Ind	O. Sands, Pres.	Chicago, Ill.			Sep'tr	Test.		
182	Mason	Elgin Creamery Co. (s)	Ind	O. Sands, Pres.	Chicago, Ill.			Sep'tr	Test.		
183	Ostrus	Elgin Creamery Co. (s)	Ind	O. Sands, Pres.	Chicago, Ill.			Sep'tr	Test.		
	Cedar County.										
184	Bennett.	Golden Star Cr'y (s)	Ind	Aug. Hinrichs & Co.	Lowden			S & G. O.	Hd		
185	Clarence.		Ind		Lowden			Sep'tr	Test.		
186	Durant.		Stk Co		Durant	Clarence.	Ernst Sieling	Sep'tr	Hd.		
187	Lowden		Ind		Lowden	Parad.	R. H. Hail	Sep'tr	Hd.		
188	Lowden		Ind		Lowden	Lowden	G. F. Brinkling	Sep'tr	Hd.		
189	Lowden		Ind		Lowden	Bennett	W. H. Kroege	Sep'tr	Hd.		
190	Springdale.		Ind	Ang. Hinrichs & Co.	West Branch.			Sep'tr	Hd.		
191	Springdale.		Ind	G. G. Eves	Lowden			Sep'tr	Hd.		
192	Tipson	Uedar Creamery.	Ind	A. Hinrichs & Co.	Lowden			Sep'tr	Hd.		
193	West Branch.	Hopewell Creamery	Ind	B. L. Dean.	Tipson	Tipson	W. Johnson	Sep'tr	Hd.		
194			Ind	G. G. Eves, Prop.	West Branch.	West Branch.	O. G. Eves	Sep'tr	Hd.		
	Cerro Gordo Co. county.										
195	Mason City.		Ind	G. H. Gurlier, Prop.	De Kalb, Ill.	Mason City.	A. E. Hoffman	Sep'tr	Test.	1219	186
196	Plymouth.		Stk Co	B. F. Humphili, Sec.	Plymouth	Plymouth	W. B. Elcomb	Sep'tr	Test.		
197	Owen.		Ind	W. F. Baum, Prop.	Portland	Portland	A. C. Mitchell	Sep'tr	Test.	66	206
198	Rockwell		Ind	W. F. Baum, Prop.	Owen	Rockwell	A. C. Crapow	Sep'tr	Test.	834	415
199	Rockwell		Stk Co	W. F. Baum, Prop.	Rockwell	Rockwell	J. C. Lakin	Sep'tr	Test.	291	213
200	Rockwell		Stk Co	W. F. Baum, Prop.	Rockwell	Rockwell	J. C. Lakin	Sep'tr	Test.		
201	Rockwell		Ind	W. F. Baum, Prop.	Rockwell	Rockwell	J. C. Lakin	Sep'tr	Test.		
202	Springdale		Ind	G. H. Gurlier, Prop.	Springdale	Springdale	C. H. Cook	Sep'tr	Test.		
203	Thornon		Co-op.	P. A. Anderson, Sec.	Thornon	Thornon	W. Johnson	Sep'tr	Test.		
204	Thornon		(s)		Miller		W. Johnson	Sep'tr	Test.		
	Cherokee County.										
205	Aurelia.	Aurelia Creamery	Ind	Kirksey & Matson.	Aurelia	Aurelia	P. Matson	Sep'tr	Hd.	1519	439
206	Beum	Meriden Creamery (s)	Ind	U. O. Adams, Prop.	Meriden			Sep'tr	Hd.		

205	Oleghorn.....	Ind..	O. O. Adams, Prop.	Meriden.....	Sept'r..	Hd.	
207	Oberkree.....	Ind..	Shaul & Stanford...	Quimby.....	Sept'r..	Test.	1264 194
208	Fielding.....	Ind..	B. O. Skewis.....	Marcus.....	Sept'r..	Test.	
209	Larabee.....	Ind..	A. Youner.....	Larabee.....	Sept'r..	Test.	
210	Marcus.....	Ind..	B. O. Skewis.....	Marcus.....	Sept'r..	Hd.	1021 81
211	Meriden.....	Ind..	O. O. Adams, Prop.	Meriden.....	Sept'r..	Test.	
212	Quimby.....	Ind..	Shaul & Stanford...	Quimby.....	Sept'r..	Test.	
213	Washita.....	Co-op.	Jas. Robertson, Jr.	Washita.....	Sept'r..	Test.	
Chickasaw Co.							
214	Alta Vista.....	Co-op.	Wm. Viok, Mgr.	Alta Vista.....	Sept'r..	Test.	50 878
215	Russell.....	Co-op.		Bassett.....	Sept'r..	Test.	686 229
216	Boyd.....	Co-op.		Boyd.....	Sept'r..	Test.	
217	Deerfield.....	Co-op.		Deerfield.....	Sept'r..	Test.	1229 172
218	Devon.....	Co-op.		New Hampton.....	Sept'r..	Test.	1154 84
219	Fredricksburg.....	Ind..		New Hampton.....	Sept'r..	Test.	181 273
220	Fredricksburg.....	Co-op.		Fr dricksburg.....	Sept'r..	Test.	317 275
221	Ionia.....	Co-op.		Ionia.....	Sept'r..	Test.	
222	Jerico.....	Co-op.		Jerico.....	Sept'r..	Test.	1273 225
223	Lawler.....	Co-op.		Lawler.....	Sept'r..	Test.	1221 101
224	Little Turkey.....	Ind..	A. O. Elvridge.....	Elkader.....	Sept'r..	Test.	
225	Nashua.....	Ind..		Nashua.....	Sept'r..	Test.	
226	Nashua.....	Stk Co	C. L. Putney, Mgr.		G O.....	Test.	
227	Nashua.....	Stk Co	E. J. Graham, Mgr.		R & G O.....	Test.	
228	Nashua.....	Stk Co	E. J. Graham, Mgr.		R & G O.....	Test.	
229	New Hampton.....	Ind..	James Campbell.....		Sept'r..	Test.	1184 573
230	New Hampton.....	Co-op.	O. E. Pierce, Sec.		Sept'r..	Test.	1331 333
231	No. Washington.....	Co-op.	F. N. Gindorf, Sec.		Sept'r..	Test.	56 385
232	New Hampton.....	Ind..	James Campbell.....		Sept'r..	Test.	1479 447
233	New Hampton.....	Co-op.	Julius Hall, Sec.		Sept'r..	Test.	
234	Saunder.....	Co-op.	H. O. Natvig, Mgr.	Saunder.....	Sept'r..	Test.	
Clarke County							
235	Hopewille.....	Ind..	O. Sands, Pres.	Chicago, Ill.....	Sept'r..	Test.	
236	Lacelle.....	Ind..	O. Sands, Pres.	Chicago, Ill.....	Sept'r..	Test.	
237	Murray.....	Ind..	O. Sands, Pres.	Chicago, Ill.....	Sept'r..	Test.	
238	Murray.....	Ind..	O. Sands, Pres.	Chicago, Ill.....	Sept'r..	Test.	
239	Oswego.....	Ind..	MacKee Bros.....	Des Moines.....	Sept'r..	Test.	1330 220
240	Woodburn.....	Ind..	Fred Mohler, Prop.	Woodburn.....	Sept'r..	Test.	
Clay County							
241	Dickens.....	Ind..	O. W. Parsons, Prop.	Dickens.....	Sept'r..	Test.	1059 28
242	Dickens.....	Ind..		Dickens.....	Sept'r..	Test.	22 118
243	Everly.....	Stk Co		Everly.....	Sept'r..	Test.	1134 112
244	Fostoria.....	Stk Co		Fostoria.....	Sept'r..	Test.	
245	Peterson.....	Ind..		Willow Creek.....	Sept'r..	Test.	

CREAMERY LIST—CONTINUED.

Office record number.	LOCATED AT OR NEAR.	NAME OF CREAMERY.	Owned by an individual or operated by stock company.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF BUTTER-MAKER.	Method of receiving milk or by the separator, both.	No. of D. O. test bottles.	No. of D. C. D. P. Pette.
245	Ruthven	Trumbull Lake Cr'y Co.	Ind.	G. M. Varney, Sec.	Clark	Ruthven	John Tonsfeldt	Test.	1436	430
246	Spencer	Elverton Creamery Co.	Stk Co	O. B. Ross, Sec.	Spencer	Spencer	O. B. Ross	Test.		
247	Spencer	Summit	Ind.	John's'n & Christ's'n	Spencer	Spencer .....	.....	Test.		
248	Spencer	Spencer Creamery	Ind.	John's'n & Christ's'n	Spencer	Spencer .....	.....	Test.		
Clayton County.										
249	Communla	Communla Cr'y Ass'n.	Co-op.	George Meyer, Sec.	Communla	Littleport	Peter Klink	Test.	231	463
250	Edgewood .....	.....	Ind.	.....	Edgewood	Edgewood	E. J. Whipple	Test.	1230	179
251	Elkader .....	.....	Ind.	.....	Elkader	Elkader	R. J. Plomteaux	Test.	1236	400
252	Elkader .....	.....	Ind.	.....	Edgewood	Elkader	Ole Hauge	Test.	1168	186
253	Elkader .....	.....	Co-op.	.....	Farmersburg	Farmersburg	O. J. Helmdal	Test.	1111	111
254	Farmersburg .....	.....	Co-op.	.....	Garnaville	Farmersburg	O. B. Chaudler	Test.	1313	132
255	Garnaville .....	.....	Ind.	.....	Elkader	Froelich	L. Berdats	Test.		
256	Gard .....	.....	Co-op.	.....	Elkader	Elkader	Wm Conboy	Test.		
257	Gard .....	.....	Co-op.	.....	Elkader	Elkader .....	.....	Test.		
258	Highland twp.	.....	Co-op.	.....	Edgewood	Littleport	D. Whipple	Test.	1331	343
259	Littleport .....	.....	Ind.	.....	Luana	Luana	O. C. Clifton	Test.	1188	105
260	Luana .....	.....	Co-op.	.....	McGregor	McGregor .....	.....	Test.	1163	49
261	McGregor .....	.....	Stk Co	.....	Elkader	Mederville .....	.....	Test.	1233	241
262	Mederville .....	.....	Ind.	.....	Elkader	Osborne .....	.....	Test.	161	438
263	Monona .....	.....	Ind.	.....	Elkader	Osborne .....	.....	Test.		
264	Osborne .....	.....	Stk Co	.....	Elkader	Osterdock .....	.....	Test.		
265	Osterdock .....	.....	Stk Co	.....	Elkader	Elkader .....	.....	Test.		
266	Read .....	.....	Stk Co	.....	St. Olaf	St. Olaf	I. Henderahot	Test.		
267	St. Olaf .....	.....	Ind.	.....	.....	.....	.....	Test.		
268	Strawberry Pt.	.....	Co-op.	.....	Strawberry Pt.	Strawberry Pt.	H. E. Swartz	Test.	Ri	Ri
269	Volga City	op. Creamery Co.	Co-op.	.....	Volga City	Volga City	Joe Jones	Test.		
270	Watson	Blue Grass Creamery ..	Co-op.	.....	Watson	Monona	E. L. Geno	Test.		
Clinton County.										
271	Teeds Grove	Springbrook	Ind.	.....	Elgin, Ill.	Teeds Grove	M. P. Kramer	Test.		
272	Brown	Springbrook (s)	Ind.	.....	Elgin, Ill. ....	.....	.....	Test.		
273	Springbrook	Springbrook	Ind.	.....	Elgin, Ill. ....	.....	F. H. Erlaker	Test.		
274	Charlotte .....	.....	Ind.	.....	Charlotte .....	.....	.....	Test.		

STATE DAIRY COMMISSIONER.

103

274	Delmar.	Springbrook	Ind	I Co.	Egin. II.	Delmar.	Sep'r	Test.
275	Delmar, No 36.	Diamond Gr'y Co. (6)	Ind	& Co.	Boston, Mass.	Siwood.	Sep'r	Test.
276	Elwood.	Springbrook	Ind	I Co.	Egin. II.	Siwood.	Sep'r	Test.
277	Grand Round.	Springbrook	Ind	& Co.	Boston, Mass.	Grand Round	Sep'r	Test.
278	Lost Nation, 19	Diamond Gr'y Co. (6)	Ind	& Co.	Boston, Mass.	Henry Vetter.	Sep'r	Test.
279	Lost Nation, 20	Diamond Gr'y Co. (6)	Ind	& Co.	Boston, Mass.		Sep'r	Test.
280	Lost Nation, 22	Diamond Gr'y Co. (6)	Ind	& Co.	Boston, Mass.		Sep'r	Test.
281	Oliver Tashp.	Springbrook Creamery	Ind	John Newman Co.	Egin. II.	Quigley	Sep'r	Test.
282	Quigley.	Springbrook Creamery	Ind	John Newman Co.	Egin. II.	Wetloe.	Sep'r	Test.
283	Weldon	Springbrook Creamery	Ind	John Newman Co.	Egin. II.		Sep'r	Test.
284	Wheatland	Yankee Run Gr'y (6)	Ind	Buxoll & Boettger.	Lowden		Sep'r	Hd.
Crawford County								
285	Charter Oak.	Charter Oak Gr'y Co.	Co-op	Paul F. Flane.	Charter Oak.	Charter Oak.	Sep'r	Test.
286	Odabolt.	Stockholm Creamery	Ind	Knut Mattson	Odabolt.	Odabolt.	Sep'r	Hd.
287	West Side.	Hayes Township Gr'y.	Ind	W. H. Prater, Prop.	West Side.	West Side.	Sep'r	Test.
Dallas County								
288	Adel.	MacRae Bros' Gr'y (6)	Ind	MacRae Bros.	Des Moines.	Dallas Center	Sep'r	Test.
289	Dallas Center	Dallas Center B & O Co.	Stk Co	D. E. Hog, Sec.	Dallas Center.		Sep'r	Test.
290	Dawson.	Rippay Creamery (6)	Ind.	H. D. Remington & Co.			Sep'r	Test.
291	Dexter.	Dexter Co-op. Gr'y Ass'n	Co-op	B. J. Hicks, Sec.	Brathven.	Dexter.	Sep'r	Test.
292	Granger.	Granger Creamery	Ind	M. W. Cooper, Prop.	Dexter.	Granger.	Sep'r	Test.
293	Lincoln Twp.	Park & Sons	Ind	Park & Sons	Yale.		Sep'r	Test.
294	Lincoln.	Gr'y (6)	Ind	Park & Sons.			Sep'r	Test.
295	Minburn.	Dal. Center B & O Co. (6)	Stk Co		Des Moines		Sep'r	Test.
296	Paathur.	Red Star Creamery	Ind		Perry.	Perry	Sep'r	Test.
297	Perry.		Ind	Sec.	Des Moines		Sep'r	Test.
298	Van Meter.		Stk Co		Grimes.	Woodward.	Sep'r	Test.
299	Waukeo		Ind		Woodward.		Sep'r	Test.
300	Woodward.		Ind				Sep'r	Test.
Davis County								
301	Bloomfield.	Bloomfield Creamery	Ind	W. H. Davis.	Bloomfield.	Bloomfield.	Sep'r	Test.
302	Drakeville.	Bloomfield Creamery (6)	Ind	W. H. Davis.	Bloomfield.		Sep'r	Test.
303	Pataak.	Pulaski Creamery	Ind	J. J. Miller, Prop.	Pulaski	Pulaski	G. O.	Test.
Deceatur County								
304	Grand River.	Grand River Creamery	Ind	Overholzer & Overholzer	Grand River.	Grand River.	Sep'r	Test.
305	Lamont.	Lamont Co-op. Gr'y Co.	Co-op	Ington	Lamont.	Lamont.	Sep'r	Hd.
306	Le Roy.	Le Colony Creamery (6)	Ind	R. D. Fleet, Sec.	Lamont.		Sep'r	Test.
307	Leon.	Leon Creamery	Ind	T. G. Hyde, Mgr.	Leon.	Leon.	Sep'r	Test.
308		Leon Creamery	Ind	Wm. Doran, Prop.	Leon.	Leon.	Sep'r	Test.
309			Ind		Leon.	Leon.	Sep'r	Test.
310			Ind		Leon.	Leon.	Sep'r	Test.
311			Ind		Leon.	Leon.	Sep'r	Test.
312			Ind		Leon.	Leon.	Sep'r	Test.
313			Ind		Leon.	Leon.	Sep'r	Test.
314			Ind		Leon.	Leon.	Sep'r	Test.
315			Ind		Leon.	Leon.	Sep'r	Test.
316			Ind		Leon.	Leon.	Sep'r	Test.
317			Ind		Leon.	Leon.	Sep'r	Test.
318			Ind		Leon.	Leon.	Sep'r	Test.
319			Ind		Leon.	Leon.	Sep'r	Test.
320			Ind		Leon.	Leon.	Sep'r	Test.
321			Ind		Leon.	Leon.	Sep'r	Test.
322			Ind		Leon.	Leon.	Sep'r	Test.
323			Ind		Leon.	Leon.	Sep'r	Test.
324			Ind		Leon.	Leon.	Sep'r	Test.
325			Ind		Leon.	Leon.	Sep'r	Test.
326			Ind		Leon.	Leon.	Sep'r	Test.
327			Ind		Leon.	Leon.	Sep'r	Test.
328			Ind		Leon.	Leon.	Sep'r	Test.
329			Ind		Leon.	Leon.	Sep'r	Test

Manufacture butter and cheese.

CREAMERY LIST—CONTINUED.

STATE DAIRY COMMISSIONER.

[illegible]

CREAMERY LIST--CONTINUED.

Office record number.	LOCATED AT OR NEAR.	NAME OF CREAMERY.	Owned by an individual, co-op or stock company.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF BUTTER-MAKER.	Method of receiving milk--by the test or by separator, both.	No. of D. O. test bottle.	No. of D. O. pl-bottle.
372	Maynard.....	Harlan Creamery Co..	Co-op.	E. E. Blethen, Sec..	Maynard	Maynard	A. D. Farnham	Test.	1116	1116
373	Minster		Co-op.		Minster	Fairbank	W. E. Johnson	Test.	1121	1121
374	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
375	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
376	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
377	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
378	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
379	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
380	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
381	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
382	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
383	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
384	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
385	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
386	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
387	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
388	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
389	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
390	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
391	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
392	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
393	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
394	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
395	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
396	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
397	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
398	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
399	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
400	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
401	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
402	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
403	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
404	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
405	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
406	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102
407	Oswein		Co-op.		Oswein	Oswein	A. H. Ford ..	Test.	102	102

408	Latimer	Hamilton Cr'y Co-op. Co.	Co-op.	Fred Rodemeyer, Sec.	Hampton	Latimer	W. H. Baker	Sept'r	Test.
409	Poppley	Poppley Co-op. Cr'y Co.	Co-op.	W. A. Pascoe, Sec.	Poppley	Poppley	H. Davenport	Sept'r	Test.
410	Shelfield	Shelfield	Ind.	G. E. Gurlier	De Kalb, Ill.	Shelfield		Sept'r	Test.
Greene County									
411	Adams	Adams Co-op. Cr'y	Stk Co	M. M. Reading, Mgr.	Adams	Adams	D. E. Whitney	Sept'r	Test.
412	Cooper	Coon Valley Cr'ies (S)	Ind.	Bennet Bros.	Jefferson	Cooper		Sept'r	Test.
413	Farlin	Crysal, Creamery	Ind.	C. F. Hastings, Mgr.	Farlin	Farlin	W. H. Maloy	Sept'r	Test.
414	Jefferson	Coon Valley Cr'ies	Ind.	Bennet Bros.	Grand Junction	Grand Junction	W. W. Adams	Sept'r	Test.
415	Grand Junction	Coon Valley Cr'ies	Ind.	Bennet Bros.	Grand Junction	Grand Junction	H. W. White	Sept'r	Test.
416	Eaton	Coon Valley Cr'ies	Ind.	Bennet Bros.	Eaton	Eaton	G. E. White	Sept'r	Test.
417	Poppley	Coon Valley Cr'ies	Ind.	Bennet Bros.	Poppley	Poppley	W. E. White	Sept'r	Test.
418	Scranton	Scranton Creamery Co.	Stk Co	F. D. Hamilton	Scranton	Scranton	W. E. White	Sept'r	Test.
419	Schell	Coon Valley Cr'ies (S)	Ind.	F. D. Hamilton	Scranton	Scranton	W. E. White	Sept'r	Test.
Grundy County									
420	Ackley	Johnson	Ind.	J. U. Johnson	Ackley	Ackley	P. L. Lantine	Sept'r	Test.
421	Applington		Ind.		Applington	Applington	F. E. Diller	Sept'r	Test.
422	Beaman		Ind.		Beaman	Beaman	P. McNelly	Sept'r	Test.
423	Conrad		Ind.					Sept'r	Test.
424	Dearyville		Ind.					Sept'r	Test.
425	Frederick		Ind.					Sept'r	Test.
426	Grundy Center		Ind.					Sept'r	Test.
427	Grundy Center		Ind.					Sept'r	Test.
428	Grundy Center		Ind.					Sept'r	Test.
429	Lincoln		Ind.					Sept'r	Test.
430	Martins		Ind.					Sept'r	Test.
431	New Hartford		Ind.					Sept'r	Test.
432	Reinbeck		Ind.					Sept'r	Test.
433	Reinbeck		Ind.					Sept'r	Test.
434	Reinbeck		Ind.					Sept'r	Test.
435	Reinbeck		Ind.					Sept'r	Test.
436	Wellburg		Ind.					Sept'r	Test.
437	Wellburg		Ind.					Sept'r	Test.
Guthrie County									
438	Basley	Silver Lake Cr'y (S)	Ind.	Andrew Wood	Basley	Basley		Sept'r	Test.
439	Basley		Ind.	Andrew Wood	Basley	Basley		Sept'r	Test.
440	Basley		Ind.	O. Sande, Pres.	Basley	Basley		Sept'r	Test.
441	Basley		Ind.	G. D. Hutt, Sec.	Basley	Basley		Sept'r	Test.
442	Dale City		Ind.	Andrew Wood	Guthrie Co. St.	Guthrie Co. St.	H. I. Keester	Sept'r	Test.
443	Guthrie Center		Ind.	Andrew Wood	Guthrie Co. St.	Guthrie Co. St.		Sept'r	Test.
444	North Branch		Ind.	Andrew Wood	Guthrie Co. St.	Guthrie Co. St.		Sept'r	Test.
445	North Adair		Ind.	O. Sande, Pres.	Guthrie Co. St.	Guthrie Co. St.		Sept'r	Test.
446	Menlo		Ind.	A. O. Curtis, Sec.	Menlo	Menlo	A. Kelsey	Sept'r	Test.
447	Panora		Ind.	F. F. Wilcox	Panora	Panora	F. F. Wilcox	Sept'r	Test.
448	Stuart		Ind.	O. H. H. Dixon	Stuart	Stuart	A. Oochrane	Sept'r	Test.
449	Stuart		Ind.	O. H. H. Dixon	Stuart	Stuart		Sept'r	Test.

CREAMERY LIST—CONTINUED.

Office record number	LOCATED AT OR NEAR.	NAME OF CREAMERY.	Operated by an individual, co-op or stock company.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF BUTTER-MAKER	Method of receiving milk—by the test or by separator, bath or both.	No of D. O. test bottle.	No of U. O. p. bottle.
449	Wichita	Silver Lake Or'y (S)	Ind...	Andrew Wood.	Guthrie Center	Yale	D. O. Barthlan	Test.	1149	4
450	Yale	Hamilton County.	Ind...	Park & Sons	Yale			Test.		
451	Halsburg		Co-op.	S. S. Morrison, Sec.	Halsburg	Halsburg	W. P. Plunleugh	Test.	1232	310
452	Elsworth		Co-op.	Ole O. Ellstrom	Elsworth	Jewell	H. V. McNary	Test.	1233	180
453	Jewell		Ind...	H. K. Gronbeck	Jewell	Kamrar	H. K. Gronbeck	Test.		
454	Kamrar		Co-op.	A. O. Blou	Kamrar	Kamrar	W. W. Bond	Test.		
455	Kadcliffe		Co-op.		Kadcliffe	Kadcliffe	Peter Jarvis	Test.		
456	Randall		Co-op.		Randall	Randall	H. N. Miller	Test.	1234	25
457	Stanhope		Ind...		Stanhope	Stanhope	N. O. Rlow	Test.	1235	234
458	Stratford		Ind...		Stratford	Stratford	Thos. Daniels	Test.		
459	Webster City		8th Co	ec.	Webster City	Webster City	H. E. Ford	Test.	1236	418
460	Webster City		Ind...		Webster City	Webster City	G. G. Howard	Test.		
461	Green Grove		Co-op.		Green Grove	Green Grove		Test.	1237	
462	Williams	Payne's Model	Ind...	F. B. Payne	Williams	Williams	Wm. Evans	Test.		
463	Hancock County									
464	Britt	Crystal Creamery Co.	Co-op.	I. O. Nelson, Sec.	Britt	Britt	L. A. Nelson	Test.	00	193
465	Britt		8th Co	E. W. Burges, Sec.	Britt	Britt	L. E. Kenyon	Test.	1041	8
466	Corwith		Ind...	S. P. Drennan, Mgr.	Corwith	Corwith	E. P. Drennan	Test.	177	80
467	Duncan		Co-op.	E. W. Drennan, Sec.	Duncan	Duncan	J. K. Drennan	Test.	1215	154
468	Forest City		Co-op.	E. W. Drennan, Sec.	Forest City	Forest City	J. K. Drennan	Test.	1047	87
469	Garner		Co-op.	E. M. Schuit, Sec.	Garner	Garner	O. B. Conway	Test.		
470	Goodell		Ind...	E. M. Schuit, Sec.	Goodell	Goodell	N. L. Palmer	Test.		
471	Kennett		Co-op.	E. M. Schuit, Sec.	Kennett	Kennett	J. C. Waughal	Test.		
472	Miller		Co-op.	E. M. Schuit, Sec.	Miller	Miller	J. C. Waughal	Test.		
473	Shiloh		Ind...	E. M. Schuit, Sec.	Shiloh	Shiloh	T. F. Feland	Test.	1126	97
474	West Lake		Co-op.	A. A. Lohs, Sec.	West Lake	West Lake		Test.		
475	Hardin County									
476	Alden	Alden Co-op. Or'y Co.	Co-op.	G. E. Stringer, Mgr.	Alden	Alden	B. M. Bishworth	Test.	1062	115
477	Buckeye	Kadcliffe Creamery (S)	8th Co	E. L. Chamberlain	Waterloo	Waterloo		Test.		

476	Cleaves	Ind	J. Martin & Son	Acley	Cleaves	W. T. Glens	Sep'tr	Test	1200
477	Edgemoor	Ind	F. L. Chamberlain	Waterloo	Hubbard	D. W. Mohler	Sep'tr	Test	1200
478	Hubbard	Ind	Marsh's Cr'y Co.	Hubbard	Hubbard	John L. Clark	Sep'tr	Test	1200
479	Hubbard	Co-op	J. V. White	Hubbard	Hubbard	A. P. Buchanan	Sep'tr	Test	1200
480	Hubbard	Co-op	E. E. Miller, Sec	Hubbard	Iowa Falls	E. J. Talbot	Sep'tr	Test	1200
481	Iowa Falls	Co-op	G. L. Whinnery, Sec	Iowa Falls	Iowa Falls	M. J. Manaster	Sep'tr	Test	1200
482	New River	Co-op	W. T. Kersey, Sec	Radcliffe	Radcliffe	N. H. Johnston	Sep'tr	Test	1200
483	Radcliffe	Co-op	Oscar Simpson, Sec	Radcliffe	Robertson	P. O. Winderker	Sep'tr	Test	1200
484	Radcliffe	Co-op	F. L. Chamberlain	Waterloo	Union	Thos. E. Culp	Sep'tr	Test	1200
485	Robertson	Co-op	P. F. Patton	Waterloo	Whitson	E. J. Evans	Sep'tr	Test	1200
486	Union	Co-op	Thos. E. Culp	Waterloo					
487	Whitson	Ind	E. J. Evans	Waterloo					
488	Harmon County								
489	Dunlap	Co-op	F. W. Shellman, Mgr.	Dunlap	Dunlap	F. W. Shellman	Sep'tr	Test	1200
490	Garne	Ind	M. H. Tellman & Co.	Mc. Valley	River Sioux	E. J. Ellis	Sep'tr	Test	1200
491	Little Sioux	Ind	M. H. Tellman & Co.	Mc. Valley	River Sioux	Geo. F. Scott	Sep'tr	Test	1200
492	Magnolia	Co-op	P. H. Odwell, Sec	Logan	Logan	Mrs. Tellman	Sep'tr	Test	1200
493	Missouri Valley	Co-op	M. H. Tellman & Co.	Mc. Valley	Mc. Valley				
494	Henry County								
495	Mt. Pleasant	Ind	R. S. Parker	Mt. Pleasant	Mt. Pleasant	S. B. Parker	Sep'tr	Test	1200
496	Tipton	Ind	W. G. Clark	Mt. Pleasant	Winfield	H. Cooper	Sep'tr	Test	1200
497	Winfield	Ind	J. A. Eicher	Winfield	Winfield				
498	Howard County								
499	Acme	Ind	A. J. Dilly	Acme	Lowther	A. P. Mott	Sep'tr	Test	1200
500	Boat	Ind	A. O. Elledge	Boat	Chesler	F. Hoopman	Sep'tr	Test	1200
501	Boat	Co-op	I. J. Isbell	Chesler	Chesler	J. H. Barker	Sep'tr	Test	1200
502	Boat	Co-op	W. A. Green	Oreco	Oreco	B. H. Arness	Sep'tr	Test	1200
503	Boat	Co-op	A. O. Elledge	Boat	Boat	Geo. Hatter	Sep'tr	Test	1200
504	Boat	Ind	W. E. Owen	Oreco	Oreco	J. A. Doestel	Sep'tr	Test	1200
505	Boat	Co-op	J. A. Doestel	Boat	Boat				
506	Boat	Ind	A. O. Elledge	Boat	Boat				
507	Boat	Co-op	F. D. Arnold, Sec	Grove	Arnold Sta.	E. M. Vargison	Sep'tr	Test	1200
508	Boat	Co-op	O. A. Keasing, Sec	Boat	Boat	W. L. Roeling	Sep'tr	Test	1200
509	Boat	Co-op	J. L. Van Horn	Boat	Boat	W. L. Diger	Sep'tr	Test	1200
510	Boat	Co-op	McNardy Bros	Boat	Boat	J. O. Hall	Sep'tr	Test	1200
511	Boat	Co-op	G. I. Orskanbank, S.	Boat	Boat	I. J. Shurson	Sep'tr	Test	1200
512	Boat	Co-op	F. J. Clark, Sec	Boat	Boat				

CREAMERY LIST—CONTINUED.

Office record number.	LOCATED AT OR NEAR.	NAME OF CREAMERY.	Owned by an individual, co-operative or stock company.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF BOTTLER-MAKER.	Separator, both, or method of receiving milk.	No. of D. O. tests the hundred.	No. of D. O. bottles.	No. of D. O. petitions.
512	Owl Lake	Farmers' Mutual Co-op. Creamery Ass'n.	Co-op.	L. M. Michaelson, S.	Owl Lake	Goldfield	G. M. Olafson.	Sep'tr.	Test.	1446	306
513	Pioneer	Pioneer Cr'y Co.	Co-op.	W. D. Simpson	Pioneer.	Pioneer.	John Battinger	Sep'tr.	Test.	1446	306
514	Benwick	Benwick Cr'y Co.	Co-op.	Aug. Griebel, Sec.	Benwick	Benwick	W. G. Stultsback	Sep'tr.	Test.	1446	306
515	Rutland	Rutland Cr'y Ass'n.	Co-op.	W. J. Brown, Sec.	Rutland	Rutland	W. Beck	Sep'tr.	Test.	1446	306
516	Thor.	Clover.	Stk Co	Lewin Olsen, Sec.	Thor.	Thor.	Peter Peterson	Sep'tr.	Test.	1446	306
	Ida County.										
517	Arthur	Arthur Creamery	Ind.	I. G. Arthur, Mgr.	Arthur	Arthur	I. G. Arthur	Sep'tr.	Test.	1446	306
518	Battle Creek	Battle Creek Cr'y	Ind.	Switzer & Battinger	Battle Creek	Battle Creek	John Switzer	Sep'tr.	Test.	1446	306
519	Galva	Galva Creamery	Ind.	Hopkins & Hubbard	Galva	Galva	Matt Conklin	Sep'tr.	Test.	1446	306
520	Holstein	Holstein Creamery	Ind.	Hopkins & Hubbard	Holstein	Holstein	J. A. Smith	Sep'tr.	Test.	1446	306
521	Ida Grove	Ida Grove Creamery	Ind.	J. A. Smith, Mgr.	Ida Grove	Ida Grove	J. A. Smith	Sep'tr.	Test.	1446	306
	Iowa County.										
522	Conroy	Shlmer Creamery Co.	Co-op.	Homer Glass, Sec.	Conroy	Conroy	W. F. Held	Sep'tr.	Test.	1446	306
523	Conroy		Ind.	Geo. Howard	Conroy	Conroy	W. F. Held	Sep'tr.	Test.	1446	306
524	Conroy		Ind.	H. O. Brown	Conroy	Conroy	W. F. Held	Sep'tr.	Test.	1446	306
525	Conroy		Ind.	H. P. Chiles	Conroy	Conroy	W. F. Held	Sep'tr.	Test.	1446	306
526	Williamsburg	Williamsburg	Ind.	Joseph Felver	Williamsburg	Williamsburg	F. McKusker	Sep'tr.	Test.	1446	306
	Jackson County.										
527	Andrew	Andrew Lily Cr'y	Ind.	W. H. Geistfeld	Andrew	Maquoketa	W. H. Geistfeld	Sep'tr.	Test.	1446	306
528	Baldwin No 27		Ind.	Simpson, Mc I & Co	Boston, Mass.	Maquoketa	W. H. Geistfeld	Sep'tr.	Test.	1446	306
529	Bernard		Co-op.	J. H. Dunn	Bernard	Bernard	Jas Church	Sep'tr.	Test.	1446	306
530	Ottumville		Ind.	Peter Butler, Mgr.	Fulton	Maquoketa	Chas. Voth	Sep'tr.	Test.	1446	306
531	Fulton		Co-op.	G. E. Kelley	Fulton	Maquoketa	Chas. Voth	Sep'tr.	Test.	1446	306
532	Jackson		Ind.	O. M. Kester	Springbrook	Maquoketa	Chas. Voth	Sep'tr.	Test.	1446	306
533	Lamotte		Ind.	Peter Kester, Mgr.	Lamotte	Lamotte	Geo. Wiedler	Sep'tr.	Test.	1446	306
534	Lamotte		Ind.	Peter Butler, Mgr.	Lamotte	Lamotte	Peter Butler	Sep'tr.	Test.	1446	306
535	Lamotte		Ind.	N. A. Hoffman	Lamotte	Lamotte	John Hoffman	Sep'tr.	Test.	1446	306
536	Maquoketa		Ind.	W. M. Miller Sec.	Maquoketa	Switico	John Hoffman	Sep'tr.	Test.	1446	306
537	Monmouth	Creamery	Co-op.	W. M. Miller Sec.	Maquoketa	Switico	John Hoffman	Sep'tr.	Test.	1446	306
	Monmouth	Emeline	Ind.	W. Brady & Son	Emeline	Monmouth	Henry Brady	Sep'tr.	Test.	1446	306

STATE DAIRY COMMISSIONER.

111

Monmouth	Monmouth C-op. Or'y Co	Geo. Sokol, Sec.	Monmouth	Monmouth	Sam Conley...	Test.	221
Preston	Springbrook	Jno. Newman & Co.	Sign. Ill.	Preston	W. J. Negus	Test.	222
Preston	Preston City Ass'n	S. N. Howard, Sec.	Preston	Preston	A. G. Clark	Test.	223
Springville	Springbrook Or'y Co	O. M. Kegler	Springbrook	Springbrook	S. G. C.	Test.	224
Springville	Springbrook Or'y Co	Jno. Newman & Co.	Spring, Ill.	Springbrook	S. G. C.	Test.	225
St. Donatus	Lamotte Creamery Co	Jno. Newman & Co.	Lamotte	Lamotte	S. G. C.	Test.	226
St. Donatus	Springbrook Or'y Co	Peter Butler, Mgr.	St. Donatus	St. Donatus	S. G. C.	Test.	227
Union Center	Springbrook Or'y Co	Jno. Newman & Co.	Union Center	Union Center	S. G. C.	Test.	228
Zwinglie	Lable Bros.	Geo. Laible	Zwinglie	Zwinglie	Geo. Laible	Test.	229
Jasper County.							
Barter	Barter Dairy Co.	H. Krump, Jr., Sec.	Barter	Barter	R. E. Itkin	Test.	230
Barter	Barter	Harris & Co.	Barter	Barter	N. A. Tait	Test.	231
Barter	Barter	Harris & Co.	Barter	Barter	N. A. Tait	Test.	232
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	233
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	234
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	235
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	236
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	237
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	238
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	239
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	240
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	241
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	242
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	243
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	244
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	245
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	246
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	247
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	248
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	249
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	250
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	251
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	252
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	253
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	254
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	255
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	256
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	257
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	258
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	259
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	260
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	261
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	262
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	263
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	264
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	265
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	266
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	267
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	268
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	269
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	270
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	271
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	272
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	273
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	274
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	275
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	276
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	277
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	278
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.	279
Kellogg	Kellogg	K. O. Clarke	Kellogg	Kellogg	N. H. Payne	Test.</	

CREAMERY LIST—CONTINUED.

Office record number.	LOCATED AT OR NEAR.	NAME OF CREAMERY.	Owned by an individual, co-operative or stock company.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF BUTTER-MAKER.	Refrigerator, bath, both.	Method of testing the milk—by the hundred, or by the test of D. O. test.	No. of D. O. test bottles.	No. of D. O. test bottles.
576	Anamosa	Osage Center Creamery	Ind.	S. M. Muzzey	Anamosa	Anamosa	S. M. Muzzey	Sep'tr	Test	1895	1895
577	Cascade		Co-op.		Cascade	Cascade	G. Adamson	Sep'tr	Test	1895	1895
578	Center Jct.		Ind.		Center	Center Jct.	S. & G. O.	Sep'tr	Test	1895	1895
579	Hale		Stk Co		Hale	Hale	C. E. Mills	Sep'tr	Test	1895	1895
580	Langworthy		Co-op.		Langworthy	Langworthy	J. H. Brownell	Sep'tr	Test	1895	1895
581	Marquette		Ind.		Marquette	Marquette	S. O. Hatchid	Sep'tr	Test	1895	1895
582	Monticello		Co-op.		Monticello	Monticello	Wm. Grubb	Sep'tr	Test	1895	1895
583	Anamosa, No. 4	Diamond Cr'y Co. (S)	Ind.	Simpson, Mcl. & Co.	Anamosa	Monticello	G. L. Pustetoy	Sep'tr	Test	1895	1895
584	Langworthy, S. G.	Diamond Cr'y Co. (S)	Ind.	Simpson, Mcl. & Co.	Anamosa	Monticello	G. L. Pustetoy	Sep'tr	Test	1895	1895
585	Monticello	Diamond Cr'y Co. (S)	Ind.	Simpson, Mcl. & Co.	Anamosa	Monticello	G. L. Pustetoy	Sep'tr	Test	1895	1895
586	Monticello, No. 1	Diamond Cr'y Co. (S)	Ind.	Simpson, Mcl. & Co.	Anamosa	Monticello	G. L. Pustetoy	Sep'tr	Test	1895	1895
587	Monticello, S. D.	Diamond Cr'y Co. (S)	Ind.	Simpson, Mcl. & Co.	Anamosa	Monticello	G. L. Pustetoy	Sep'tr	Test	1895	1895
588	Monticello, No. 2	Diamond Cr'y Co. (S)	Ind.	Simpson, Mcl. & Co.	Anamosa	Monticello	G. L. Pustetoy	Sep'tr	Test	1895	1895
589	Monticello, No. 3	Diamond Cr'y Co. (S)	Ind.	Simpson, Mcl. & Co.	Anamosa	Monticello	G. L. Pustetoy	Sep'tr	Test	1895	1895
590	Monticello, No. 4	Diamond Cr'y Co. (S)	Ind.	Simpson, Mcl. & Co.	Anamosa	Monticello	G. L. Pustetoy	Sep'tr	Test	1895	1895
591	Monticello, No. 5	Diamond Cr'y Co. (S)	Ind.	Simpson, Mcl. & Co.	Anamosa	Monticello	G. L. Pustetoy	Sep'tr	Test	1895	1895
592	Monticello, No. 6	Diamond Cr'y Co. (S)	Ind.	Simpson, Mcl. & Co.	Anamosa	Monticello	G. L. Pustetoy	Sep'tr	Test	1895	1895
593	Monticello, No. 7	Diamond Cr'y Co. (S)	Ind.	Simpson, Mcl. & Co.	Anamosa	Monticello	G. L. Pustetoy	Sep'tr	Test	1895	1895
594	Monticello, No. 8	Diamond Cr'y Co. (S)	Ind.	Simpson, Mcl. & Co.	Anamosa	Monticello	G. L. Pustetoy	Sep'tr	Test	1895	1895
595	Monticello, No. 9	Diamond Cr'y Co. (S)	Ind.	Simpson, Mcl. & Co.	Anamosa	Monticello	G. L. Pustetoy	Sep'tr	Test	1895	1895
596	Monticello, No. 10	Diamond Cr'y Co. (S)	Ind.	Simpson, Mcl. & Co.	Anamosa	Monticello	G. L. Pustetoy	Sep'tr	Test	1895	1895
597	Monticello, No. 11	Diamond Cr'y Co. (S)	Ind.	Simpson, Mcl. & Co.	Anamosa	Monticello	G. L. Pustetoy	Sep'tr	Test	1895	1895
598	Monticello, No. 12	Diamond Cr'y Co. (S)	Ind.	Simpson, Mcl. & Co.	Anamosa	Monticello	G. L. Pustetoy	Sep'tr	Test	1895	1895
599	Monticello, No. 13	Diamond Cr'y Co. (S)	Ind.	Simpson, Mcl. & Co.	Anamosa	Monticello	G. L. Pustetoy	Sep'tr	Test	1895	1895
600	Delta	Delta Creamery	Ind.	Jas. Dickson	Delta	Delta	H. S. Wood	Sep'tr	Test	1895	1895
601	Delta	Delta Creamery	Stk Co	S. E. Dickson	Delta	Delta	J. H. Brownell	Sep'tr	Test	1895	1895
602	Delta	Delta Creamery	Ind.	F. L. Emery	Delta	Delta	F. L. Emery	Sep'tr	Test	1895	1895
603	Albion	Albion Creamery	Co-op.	Q. W. Hopkins	Albion	Albion	L. I. Tobolski	Sep'tr	Test	1895	1895
604	Albion	Albion Creamery	Co-op.	A. W. Sterzbach	Albion	Albion	A. W. Sterzbach	Sep'tr	Test	1895	1895

[illegible]

CREAMERY LIST—CONTINUED.

Office record	LOCATED AT OR NEAR.	NAME OF CREAMERY.	Owned by individual or operated by stock company.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS FOR SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF BUTTER-MAKER.	Separator, sub-merged cream, or both.	Method of receiving milk or by the test or by Hd.	No. of D. O. tests the hundred.	No. of D. O. bottle tests.
647	Toddville	Monroe Creamery.	Stock.	O. M. Fisher, Sec.	Toddville	Toddville.	O. M. Fisher.	Sep'tr	Test.	1871	128
648	Troy Mills	Troy Mills	Ind.	E. G. Gard, Prop.	Troy Mills	Walker.	Chas. Walton.	Sep'tr	Hd.		
649	Troy Mills	----- Co	Co-op	John Tebl.	Walker.	Walker.	J. M. Tupper.	Sep'tr	Hd.		
650	Walker.	-----	Ind.	H. J. Neter.	Walker.	Walker.	S. W. Laird.	Sep'tr	Test.		
651	Waukeek	-----	Ind.	Bates & Hemenway.	Waukeek	Central City.	H. O. Hemenway.	Sep'tr	Hd.		
652	Waukeek	-----	Ind.	A. L. Corry	Waukeek	Central City.	A. L. Corry.	Sep'tr	Hd.		
653	West'n College	----- (s).	Stock.	J. C. Dvorak, Sec.	Ely	-----	-----	Sep'tr	Test.		
	Louisa County										
654	Fredonia	Fredonia Creamery	Ind.	Thomas Carey.	Fredonia	Fredonia	E. W. Kelly.	G. O.	Test.		
655	Letts	Letts Creamery.	Ind.	J. M. Hildebrand.	Letts	Letts	J. M. Hildebrand.	G. O.	Test.		
656	Wapello	Wapello Creamery.	Ind.	F. P. Bricetboch.	Wapello.	Wapello	F. P. Bricetboch.	G. O.	Test.		
	Lucas County										
657	Derby	Old Colony Cr. y (s)	Ind.	T. G. Hyde, Mgr.	Emmeston	Emmeston	W. J. Marshall.	Sep'tr	Test.		
658	Russell.	Russell Creamery Co.	Stock.	W. J. Marshall, Sec.	Russell.	Russell	-----	Sep'tr	Test.		
	Lyon County										
659	George	George	Ind.	M. M. Lewis, Prop.	Inwood	Inwood	A. Nordmark.	Sep'tr	Test.	886	96
660	Inwood	Inwood Creamery.	Ind.	A. Nordmark.	Inwood	Inwood	-----	Sep'tr	Test.		
661	Klondyke	Inwood Creamery (s).	Ind.	-----	Inwood	Inwood	-----	Sep'tr	Test.		
662	Larchwood	Co-op Cr. y A	Co-op	C. B. Martie, Sec.	Larchwood	Larchwood	Geo. Gardner.	Sep'tr	Hd.	187	264
663	Lester	Lester Creamery Co	Stk Co	L. W. Billings.	Lester	Lester	L. W. Billings.	Sep'tr	Hd.	187	264
664	Rock Rapids.	Rock Rapids Creamery.	Ind.	H. E. Morrow, Mgr.	Rock Rapids.	Rock Rapids.	H. E. Morrow.	Sep'tr	Test.	1869	271
	Madison County										
665	Barney	Barney	Ind.	W. A. Mariatt, Sec.	Algona	Barney.	John De Lay	Sep'tr	Test.	1179	76
666	Barham	McKee Bros. (s)	Ind.	McKee Bros.	Des Moines	Barney.	-----	Sep'tr	Test.		
667	Pitzer	Jackson Creamery Co.	Co-op.	W. Epperd, Pres.	Pitzer	Winterset	--- Carpenter.	Sep'tr	Test.		

STATE DAIRY COMMISSIONER.

<i>Nebraska Council</i>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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CREAMERY LIST—CONTINUED.

Office record number.	LOCATED AT OR NEAR.	NAMES OF CREAMERY.	Owned by an individual, cooperative stock company.	Method of receiving milk—by the hundred, in milk or by separator, each-both.	Test.	No. of D. C. test bottle.	No. of D. C. pl-pette.
<i>Monroe County.</i>							
698	Albia.....	Albia Creamery.....	Ind..	Sep'tr..	Test..		
<i>Montgomery County.</i>							
699	Elliott.....	Egin Creamery Co.....	Ind..	Sep'tr..	Test..		
700	Stanton.....	Egin Creamery Co. (a) ..	Ind..	Sep'tr..	Test..		
701	Villisca.....	Egin Creamery Co. (a) ..	Ind..	Sep'tr..	Test..		
<i>Muscatine County.</i>							
702	Atalissa.....	Iowa Creamery Co.....	Stk Co	G. C..	Test..		
703	Moscow.....	Nickel Plate Dry (a) ..	Ind..	S. & G. O	Hd.		
704	West Liberty..	Oedar Valley Creamery	Ind..	S. & G. O	Hd.		
705	Wilton.....	Iowa Creamery Co.....	Stk Co	S. & G. O	Both.		
		Nickel Plate Creamery.	Ind..	S. & G. O	Hd.		
<i>O'Brien County.</i>							
707	Germanstown..	Galedonia Creamery Co	Stk Co	James T. Starr	Test..		
708	Hartley.....	Prattville Creamery ..	Ind..	.....	Hd.		
709	Paulina.....	.....	Stk Co	.....	Hd.		
710	Pringhar.....	.....	Ind..	.....	Hd.		
711	Sheldon.....	.....	Ind..	.....	Hd.		
712	Sutherland.....	.....	Ind..	.....	Hd.		
<i>Osceola County.</i>							
713	Ashton.....	Ashton Creamery.....	Ind..	.....	Test..		
714	Ocheyedan...	Ocheyedan Creamery...	Ind..	.....	Test..		
<i>Page County.</i>							
715	Blanchard...	Blanchard Creamery...	Ind..	.....	Test..		

716	Clarinda.	Stk Co	B. J. Sunderman, Sec	Clarinda.	Clarinda.	I. N. Clark.	Sep'tr.	Test.	1097	314
717	College Springs	Ind.	J. J. Thompson.	Blanchard.	Essex.	Essex.	Sep'tr.	Test.	1098	33
718	Essex.	Stk Co	T. K. Elliott, Sec.	Essex.	Shambaugh.	Chas. Gillaple	Sep'tr.	Test.	1409	228
719	Shambaugh.	Stk Co	G. E. Redman, Sec.	Shambaugh.	Shenandoah.	O. G. Voigt.	Sep'tr.	Test.	1288	325
720	Shenandoah.	Co-op.	O. G. Voigt.	Shenandoah.	Yorktown.	Wm. Kimble.	Sep'tr.	Test.	994	167
721	Yorktown.	Stk Co	B. S. Loy, Sec.	Yorktown.			Sep'tr.	Test.		
Palo Alto Co.										
722	Ayrshire.	Co-op.	J. H. Marton.	Ayrshire.	Ayrshire.	N. H. Tremble.	Sep'tr.	Test.	1097	314
723	Ourlew.	Co-op.	G. W. Downs, Sec.	Ourlew.	Ourlew.		Sep'tr.	Test.	1098	33
724	Ourlew.	Co-op.	Geo. De Mouth, Sec.	Ourlew.	Cylinder.	W. W. Board.	Sep'tr.	Test.	1409	228
725	Cylinder.	Co-op.	O. E. Erickson, Sec.	Depew.	Emmetsburg.	N. Nuton.	Sep'tr.	Test.	1288	325
726	Emmetsburg.	Stk Co	L. Stuehmer, Sec.	Emmetsburg.	Mallard.	T. E. Wilson.	Sep'tr.	Test.	994	167
727	Whittenmore.	Co-op.	Thomas Kirby.	Emmetsburg.	Whittenmore.	A. C. Kreslin.	Sep'tr.	Test.	673	290
728	Whittenmore.	Co-op.	Aug. Stahl.	Fallville.	Grættlinger.	Christ Mark.	Sep'tr.	Test.	1160	63
729	Grættlinger.	Co-op.	L. C. O'Brien, Sec.	Fallville.	Grættlinger.	A. J. Johnson.	Sep'tr.	Test.	1409	228
730	Grættlinger.	Co-op.	E. C.	Mallard.	Grættlinger.	E. Chadwick.	Sep'tr.	Test.	746	178
731	Mallard.	Co-op.	E. C.	Osgood.	Osgood.	Fred Hacker.	Sep'tr.	Test.	1227	169
732	Rodman.	Co-op.	E. C.	Rodman.	Rodman.	O. Peterson.	Sep'tr.	Test.	1284	308
733	Ruthven.	Co-op.	G. L.	Ruthven.	Ruthven.	W. H. Haller.	Sep'tr.	Test.	806	355
734	Ruthven.	Co-op.	H.	Ruthven.	Ruthven.	E. J. Remington.	Sep'tr.	Test.	1296	184
735	Ruthven.	Co-op.	Geo. W. Brown, Sec.	Ruthven.	West Bend.	T. A. Clark.	Sep'tr.	Test.		
736	West Bend.	Co-op.	Henry Dunn.	West Bend.	West Bend.	H. G. Carpenter.	Sep'tr.	Test.		
737	West Bend.	Co-op.		West Bend.	West Bend.		Sep'tr.	Test.		
738	West Bend.	Co-op.		West Bend.	West Bend.		Sep'tr.	Test.		
Plymouth Co.										
740	Ellendale.	Co-op.	J. F. Gorman.	Ellendale.	Merrill.	Wm. Anderson.	Sep'tr.	Test.	1358	209
741	Hinton.	Stk Co	W. G. Pearson.	Hinton.	Hinton.	J. B. Deberling.	Sep'tr.	Test.	753	200
742	Le Mars.	Co-op.	C. Shearon.	Le Mars.	Le Mars.	O. B. Horrocks.	Sep'tr.	Test.		
743	Merrill.	Stk Co	E. M. Orouch, Sec.	Merrill.	Le Mars.		Sep'tr.	Test.		
744	Millerville.	Stk Co	J. F. Banks, Sec.	Millerville.	Sioux City.	O. Mikelson.	Sep'tr.	Test.	1164	83
745	Neptune.	Co-op.	Das O'Brien.	Neptune.	Le Mars.	A. J. Freese.	Sep'tr.	Test.	1418	268
746	Oyens.	Co-op.	E. B. Eyres, Sec.	Oyens.	Oyens.	J. O. Mortison.	Sep'tr.	Test.	1163	48
747	Oyens.	Co-op.	P. F. Hickey, Sec.	Oyens.	Remsen.	H. Hazenbank.	Sep'tr.	Test.	1292	278
748	Remsen.	Co-op.	Peter Arens, Agr.	Remsen.	Dalton.	J. Kennedy.	Sep'tr.	Test.	E 3	8
749	Struble.	Co-op.	H. F. Maus, Sec.	Struble.	Struble.	Andy Stennum.	Sep'tr.	Test.		
750	Struble.	Co-op.	Garret Lewis.	Struble.	Struble.		Sep'tr.	Test.		
Pocahontas Co										
751	Fonda.	Co-op.	J. D. Fitzgerald.	Fonda.	Fonda.	B. M. Lamb.	Sep'tr.	Test.	7	249
752	Fonda.	Ind.	R. F. Bewick, Prop.	Fonda.	Fonda.		Sep'tr.	Test.		
753	Havelock.	Ind.	W. & J. G. Hinn.	Laurens.	Laurens.	F. W. Johnson.	Sep'tr.	Test.	1151	324
754	Laurens.	Ind.	W. & J. G. Hinn.	Laurens.	Laurens.	Peter M. Jerm.	Sep'tr.	Test.	1239	269
755	Lisard.	Stk Co	Geo. Stobels, Sec.	Laurens.	Laurens.		Sep'tr.	Test.		
756	Mud Lake.	Ind.	W. & J. G. Hinn.	Laurens.	Laurens.		Sep'tr.	Test.		

CREAMERY LIST—CONTINUED.

Office record number	LOCATED AT OR NEAR	NAME OF CREAMERY	Operated by an individual, co-operative or stock company	NAME OF PROPRIETOR, SECRETARY OR MANAGER	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER	SHIPPING STATION	NAME OF BUTTER-MARKER	Method of receiving cream, or separator, bath	In milk—by the test or by the hundred	No. of U. C. test bottle	No. of D. O. patent
767	Pocahontas	Pocahontas Creamery	Ind.	Hinn Bros	Laurens	Rolfe	O. R. Johnson	Sep'tr	Test	1450	446
768	Pomeroy	Bretholz Creamery	Ind.	E. C. M. Bretholz, Prop.	Pomeroy	Pomeroy	Wm. Bretholz	Sep'tr	Test	1666	849
769	Rolfe	"	Ind.	B. Fisher, Prop.	Pomeroy	Pomeroy	B. Fisher	Sep'tr	Test	1118	82
770	Rolfe	"	Co-op	W. A. Rogers, Prop.	Rolfe	Rolfe	Will Kucker	Sep'tr	Test	1686	837
771	Rusk	"	Ind.	E. O. Christensen, Sec.	Rusk	Pomeroy	E. O. Grammeth	Sep'tr	Test		
772	Sac City	Roesbud (s)	Ind.	E. E. Beawick, Fr. p	Fonda			Sep'tr	Test		
Polk County											
773	Rondurant	Marshall Cr'y Co. (s)	Stk Co	W. D. Collier, Mgr.	Marshalltown			Sep'tr	Test		
774	Campbell	Grimes B. & O. Co. (s)	Stk Co		Grimes			Sep'tr	Test	1898	841
775	Des Moines	Crystal Springs	Ind.		Des Moines	Des Moines	E. S. Storek	Sep'tr	Test	1820	838
776	Grimes	Grimes B. & O. Co.	Stk Co		Grimes	Grimes	G. A. Brewster	Sep'tr	Test		
777	Marshall	Kaystone Creamery	Ind.		Marshall	Marshall		Sep'tr	Test		
778	Mitchellville	Mitchellville Cr'y Ass'n	Co-op		Mitchellville	Mitchellville	Geo. E. Roller	Sep'tr	Test		
779	Wainut	Walnut Creamery	Ind.	N. O. Madson, Prop.	Walnut	Walnut	N. O. Madson	Sep'tr	Test		
Polk and Hancock Counties											
770	Avoca	Avoca Creamery	Ind.	R. Frost, Prop.	Avoca	Avoca	Chr. Sorensen	G. O.	Test		
771	Hancock	"	Ind.	H. C. Brandes, Prop.	Hancock	Hancock	S. G. Milbiser	Sep'tr	Test		
772	Macedonia	"	Stk Co	S. M. Grider, Mgr.	Macedonia	Macedonia	S. M. Grider	Sep'tr	Test		
773	Minden	"	Co-op	Samuel Brown, Sec.	Minden	Minden	W. P. Jepsen	G. O.	Test	1499	439
774	Minden	"	Co-op	R. Elchertberger, Sec.	Minden	Minden	John D. Kish	Sep'tr	Test		
775	Treynor	Treynor Creamery Co.	Ind.	F. G. Elvey	Treynor	Council Bluffs	J. N. Behavers	Sep'tr	Test	R19	R19
Pocahontas County											
777	Brooklyn	Brooklyn Creamery	Ind.	M. A. Heigh, Mgr.	Brooklyn	Brooklyn	J. W. Heigh	G. O.	Test		
778	Deep River	Deep River	Ind.	Hater & Baird, Fr's	Deep River	Deep River	E. W. Kinster	G. O.	Test		
779	Grinnell	"	Ind.	J. W. Fowler	Grinnell	Grinnell	A. Christensen	Sep'tr	Test		
780	Grinnell	"	Ind.	Marshall Cr'y Co.	Marshalltown	Marshalltown		Sep'tr	Test		
781	Guernsey	"	Ind.	A. L. Minehart, Sec.	Guernsey	Guernsey	A. L. Minehart	G. O.	Test		
782	Hartwick	"	Ind.	John Newman Co.	Hartwick	Hartwick	D. A. Murphy	Sep'tr	Test		
783	Malcom	Malcom Creamery Co.	Ind.	Alexander & Vohs	Malcom	Malcom		Sep'tr	Test	1407	247
784	Montezuma	Montezuma Creamery	Co-op	John Hall, Jr., Sec.	Montezuma	Montezuma		Sep'tr	Test		

[illegible]

CREAMERY LIST—CONTINUED.

Ohio record number	LOCATED AT OR NEAR.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	F. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF BUTTER-MAKER	Separator, salted cream, or both.	Method of receiving milk or by the hundred	No. of D. O. test bottles.	No. of D. O. p. pette.
830	Rock Valley...	O. A. Stensvad...	Rock Valley...	Rock Valley...	O. A. Stensvad...	Sept'r...	Hd.		
831	Sioux Center...	A. D. Roseboom...	Sioux Center...	Sioux Center...	A. D. Roseboom...	Sept'r...	Hd.		
832	Sioux Center...	John Stensvad...	Sioux Center...	Sioux Center...	John Stensvad...	Sept'r...	Hd.		
833	Sioux Center...	A. D. Roseboom...	Sioux Center...	Sioux Center...		Sept'r...	Hd.		
834	Sioux County.								
835	Ames	Geo. L. McKay, Mgr.	Ames	Ames	Henry Evans...	Sept'r...	Test.	133	133
836	Cambridge...								
837	Collins...	Oliver Hill, Sec.	Cambridge...	Cambridge...	Wm Hommel...	Sept'r...	Test.	133	133
838	Collins...	A. G. Armstrong, Sec.	Collins...	Collins...	A. G. Armstrong...	Sept'r...	Test.	133	133
839	Collins...	L. M. Kelly...	Collins...	Collins...	L. M. Kelly...	Sept'r...	Test.	133	133
840	Collins...	Peter Jensen, Prop.	Collins...	Collins...	Peter Jensen...	Sept'r...	Test.	133	133
841	Collins...	John Stensvad, Sec.	Collins...	Collins...	J. F. Burdett...	Sept'r...	Test.	133	133
842	Collins...	J. F. Gerbracht, Sec.	Collins...	Collins...	Raymond Erb...	Sept'r...	Test.	133	133
843	Collins...	Jas Romine, Mgr.	Collins...	Collins...	Jas Romine...	Sept'r...	Test.	133	133
844	Collins...	Boardman Bros.	Collins...	Collins...	T. R. Russell...	Sept'r...	Test.	133	133
845	Collins...	E. W. Kimble, Sec.	Collins...	Collins...	L. Shepard...	Sept'r...	Test.	133	133
846	Collins...	E. J. Evenson, Sec.	Collins...	Collins...	R. Nelson...	Sept'r...	Test.	133	133
847	Collins...	Ole Langland, Sec.	Collins...	Collins...	John Preeland...	Sept'r...	Test.	133	133
848	Collins...	Alex Henderson, Sec.	Collins...	Collins...	Geo. Wicks...	Sept'r...	Test.	133	133
849	Collins...	J. C. Burkhardt, Sec.	Collins...	Collins...	J. J. Ross...	Sept'r...	Test.	133	133
850	Collins...								
851	Collins...	Marshall Or'y Co.	Marshalltown...	Marshalltown...	Robert Allee...	Sept'r...	Test.	133	133
852	Collins...	John Newman Co.	Marshalltown...	Marshalltown...	O. L. Scheiber...	Sept'r...	Test.	133	133
853	Collins...	Scheiber & Merrick...	Marshalltown...	Marshalltown...	F. J. Raeder...	Sept'r...	Test.	133	133
854	Collins...	E. E. Fairbanks...	Marshalltown...	Marshalltown...	Chas. Kucera...	Sept'r...	Test.	133	133
855	Collins...	John Newman Co.	Marshalltown...	Marshalltown...	Barton Owens...	Sept'r...	Test.	133	133
856	Collins...	P. McNelly...	Marshalltown...	Marshalltown...	S. & G. O...	Sept'r...	Test.	133	133
857	Collins...	Marshall Or'y Co.	Marshalltown...	Marshalltown...	G. O...	Sept'r...	Test.	133	133
858	Collins...	Davidak & Axia...	Marshalltown...	Marshalltown...	J. G. Goidrey...	Sept'r...	Test.	133	133
859	Collins...	J. B. O'Connor...	Marshalltown...	Marshalltown...	L. L. A. Wood...	Sept'r...	Test.	133	133
860	Collins...	J. B. O'Connor...	Marshalltown...	Marshalltown...		Sept'r...	Test.	133	133

Taylor County	Bedford Creamery	Ind.	W. A. Gethman	Bedford	Bedford	W. A. Gethman	Sep'tr	Test.	000	227
360	Bedford Creamery	Ind.	W. A. Gethman	Bedford	Bedford	W. A. Gethman	Sep'tr	Test.		
361	Ularfield Or'y Co.	Stk Co	Joseph Doubet, Sec.	Clearfield	Clearfield	Geo W. McNair	Sep'tr	Test.		
362	Blue Grass Creamery	Ind.	W. A. Gethman	Conway	Conway	F. W. Ketch	Sep'tr	Test.		
363	Cold Spring Creamery	Co-op.	H. B. Moosa, Sec.	Guns.	Conway	C. E. Askren	Sep'tr	Test.		
364	Maple Grove Or'y	Ind.	E. Schoonover	Guns.	Nodaway	E. Schoonover	Sep'tr	Test.		
365	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago, Ill.	Nodaway	E. Schoonover	Sep'tr	Test.		
Union County										
366	Elgin Creamery Co.	Ind.	O. Sands, Pres.	Chicago	Alton	G. W. Kelly	Sep'tr	Test.	128	231
367	Farmers' Co-op. Or'y An	Co-op.	S. Clough, Jr., Sec.	Arispee	Arispee	Thos. L. Case	Sep'tr	Test.	1439	411
368	Elgin Creamery Co.	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
369	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
370	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
371	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
372	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
373	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
374	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
375	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
376	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
377	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
378	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
379	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
Van Buren County										
380	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
381	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
382	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
383	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
384	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
385	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
386	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
387	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
388	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
389	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
Warren County										
390	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
391	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
392	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
393	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
394	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
395	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
396	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
397	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
398	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411
399	Elgin Creamery Co. (6)	Ind.	O. Sands, Pres.	Chicago	Creston	R. T. & A. McCall	Sep'tr	Test.	1439	411

CREAMERY LIST—CONTINUED.

Office record number.	LOCATED AT OR NEAR.	NAME OF CREAMERY.	Owned by an individual, co-operative or stock company.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF BUTTER-MAKER.	Separated cream, or both.	Method of receiving milk—by the test or by the hundred.	No. of D. O. tests.	No. of D. O. bottles.
Washington County.											
893	Brighton.....	Co.	Co-op.	H. J. Kleins, Mgr.	Brighton.....	Brighton.....	F. G. Outlip.....	Sept'r.....	Test.....	803	125
894	Kalona.....	"	Ind.	W. G. Brooke.....	Kalona.....	Kalona.....	W. G. Brooke.....	Sept'r.....	Test.....		
895	Noble.....	"	Ind.	E. J. Eicher, Mgr.	Noble.....	Noble.....	E. J. Eicher.....	Sept'r.....	Test.....		
896	Riverside.....	"	Ind.	R. L. Nicola.....	Riverside.....	Riverside.....	Wm. Miles.....	Sept'r.....	Test.....		
897	Washington.....	Washington Creamery Co.	Ind.	T. L. Emery & Son.....	Brighton.....	Washington.....	Sept'r.....	Sept'r.....	Test.....		
898	Wellman.....	Wellman Creamery Co.	Stk Co	P. J. Greigg, Mgr.....	Wellman.....	Wellman.....	S. S. Stones.....	Sept'r.....	Test.....		
Wayne County.											
899	Allerton.....	Allerton Creamery.....	Ind.	Elder Bros.....	Allerton.....	Allerton.....	Elder Bros.....	Sept'r.....	Test.....	628	131
900	Cambria.....	Old Colony Cr'y Co.	Ind.	T. G. Hyde, Mgr.....	Humeston.....	Humeston.....	Sept'r.....	Sept'r.....	Test.....		
901	Oxydon.....	Old Colony Cr'y Co.	Ind.	T. G. Hyde, Mgr.....	Humeston.....	Humeston.....	J. H. Way.....	Sept'r.....	Test.....	1197	119
902	Humeston.....	Old Colony Cr'y Co.	Ind.	T. G. Hyde, Mgr.....	Humeston.....	Humeston.....	Sept'r.....	Sept'r.....	Test.....		
903	Lewisburg.....	Old Colony Cr'y Co.	Ind.	T. G. Hyde, Mgr.....	Humeston.....	Humeston.....	Sept'r.....	Sept'r.....	Test.....	727	11
904	Seymour.....	Seymour Creamery Co.	Stk Co	H. Brokaw.....	Seymour.....	Seymour.....	H. Brokaw.....	Sept'r.....	Test.....		
Webster County.											
905	Badger.....	Badger Creamery.....	Ind.	G. W. Gillman.....	Badger.....	Badger.....	G. W. Gillman.....	Sept'r.....	Test.....	1307	266
906	Burnside.....	"	Co-op.	"	Burnside.....	Burnside.....	Sept'r.....	Sept'r.....	Test.....	1319	269
907	Callender.....	"	Ind.	"	Grand Junction.....	Grand Junction.....	Sept'r.....	Sept'r.....	Test.....		
908	Clare.....	"	Ind.	"	Clare.....	Clare.....	Sept'r.....	Sept'r.....	Test.....		
909	Dayton.....	"	Ind.	"	Dayton.....	Dayton.....	Sept'r.....	Sept'r.....	Test.....		
910	Duncombe.....	"	Ind.	"	Duncombe.....	Duncombe.....	Sept'r.....	Sept'r.....	Test.....		
911	Barnum.....	"	Ind.	"	Barnum.....	Barnum.....	Sept'r.....	Sept'r.....	Test.....		
912	St. Dodge.....	"	Ind.	"	St. Dodge.....	St. Dodge.....	Sept'r.....	Sept'r.....	Test.....		
913	Gowrie.....	"	Ind.	"	Gowrie.....	Gowrie.....	Sept'r.....	Sept'r.....	Test.....		
914	Moorland.....	"	Ind.	"	Moorland.....	Moorland.....	Sept'r.....	Sept'r.....	Test.....		
915	Mooreland.....	"	Ind.	"	Mooreland.....	Mooreland.....	Sept'r.....	Sept'r.....	Test.....		
916	Vincent.....	"	Ind.	"	Vincent.....	Vincent.....	Sept'r.....	Sept'r.....	Test.....		
Winnebago County.											
917	Buffalo Center.....	Farmers' Co-op. Cr'y Co.	Co-op.	E. R. Overbaugh, Sec.	Buffalo Center.....	Buffalo Center.....	Sept'r.....	Sept'r.....	Test.....	1368	319

STATE DAIRY COMMISSIONER.

128

988	Davis' Church.	Lake Mills Or'y Co. (s).	Co-op.	Ole T. Groo, Mgr.	Lake Mills.	Forest City.	LewisRichards	Sep'tr.	Test.	1455	413
989	Forest City.	Forest City Or'y Association.	Co-op.	Peter Isaacson, Sec.	Forest City.	Forest City.	LewisRichards	Sep'tr.	Test.	1455	413
990	Hollandale.	Thompson Co-op. Or'y	Co-op.	Peter Isaacson, Sec.	Thompson.	Lake Mills.	T. A. Sorvik.	Sep'tr.	Test.	989	388
991	Lake Mills.	Lake Mills Co-op. Or'y	Co-op.	Ole T. Groo, Mgr.	Lake Mills.	Lake Mills.	J. M. Tanager.	Sep'tr.	Test.	989	388
992	Lake Mills.	Lake Mills Co-op. Or'y	Co-op.	G. N. Johnson, Pres.	Grytte.	Lake Mills.	J. M. Tanager.	Sep'tr.	Test.	989	388
993	Linden.	Linden Co-op. Or'y	Co-op.	G. N. Johnson, Pres.	Grytte.	Lake Mills.	J. M. Tanager.	Sep'tr.	Test.	989	388
994	Linden.	Linden Co-op. Or'y	Co-op.	G. N. Johnson, Pres.	Grytte.	Lake Mills.	J. M. Tanager.	Sep'tr.	Test.	989	388
995	Mc. Valley.	Mc. Valley Co-op. Or'y	Co-op.	J. S. Higinbotham, S.	Thompson.	Thompson.	J. S. Higinbotham, S.	Sep'tr.	Test.	989	388
996	Mc. Valley.	Mc. Valley Co-op. Or'y	Co-op.	B. G. Richardson, M.	Fertile.	Thompson.	J. S. Higinbotham, S.	Sep'tr.	Test.	989	388
997	Moena.	Moena Co-op. Or'y	Co-op.	Peter Isaacson, Sec.	Forest City.	Forest City.	Peter Isaacson, Sec.	Sep'tr.	Test.	989	388
998	Norman.	Norman Co-op. Or'y	Co-op.	Axel Arneson, Mgr.	Norman.	Norman.	Axel Arneson, Mgr.	Sep'tr.	Test.	989	388
999	Thompson.	Thompson Co-op. Or'y	Co-op.	Axel Arneson, Mgr.	Norman.	Norman.	Axel Arneson, Mgr.	Sep'tr.	Test.	989	388
1000	Thompson.	Thompson Co-op. Or'y	Co-op.	J. S. Higinbotham, S.	Thompson.	Thompson.	J. S. Higinbotham, S.	Sep'tr.	Test.	1175	74
1001	Thompson.	Thompson Co-op. Or'y	Co-op.	David Higin, Sec.	Thompson.	Thompson.	David Higin, Sec.	Sep'tr.	Test.	1175	74
1002	Thompson.	Thompson Co-op. Or'y	Co-op.	J. S. Higinbotham, S.	Thompson.	Thompson.	J. S. Higinbotham, S.	Sep'tr.	Test.	1175	74
Winnashet County.											
1003	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1004	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1005	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1006	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1007	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1008	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1009	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1010	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1011	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1012	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1013	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1014	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1015	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1016	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1017	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1018	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1019	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1020	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1021	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1022	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1023	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1024	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1025	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1026	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1027	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1028	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1029	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1030	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1031	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1032	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1033	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1034	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1035	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1036	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1037	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1038	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1039	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1040	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1041	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1042	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1043	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1044	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1045	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1046	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1047	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1048	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1049	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1050	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1051	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1052	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1053	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1054	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1055	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1056	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1057	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1058	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1059	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1060	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1061	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1062	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1063	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1064	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1065	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1066	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1067	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1068	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1069	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1070	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1071	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1072	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1073	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1074	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1075	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1076	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1077	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1078	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1079	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1080	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1081	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1082	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1083	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1084	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1085	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1086	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1087	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1088	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1089	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1090	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1091	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1092	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1093	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1094	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1095	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1096	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1097	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1098	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1099	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1100	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1101	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1102	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1103	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1104	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1105	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G. O.	Test.	1003	428
1106	Burr Oak.	Burr Oak Co-op. Or'y	Co-op.	O. A. Reed, Mgr.	Burr Oak	Decorah.	O. A. Reed.	G.			

CREAMERY LIST--CONTINUED.

IOWA CHEESE FACTORY LIST.

Arranged alphabetically according to counties and towns near which factory is located, together with information pertaining to each.

Office record number.	LOCATED AT OR NEAR.	NAME OF CHEESE FACTORY.	Operated by individual, co-op, or stock company.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF CHEESE-MAKER.	Method of receiving milk - by the test or by the hundred.	No. of D. O. test bottle.	No. of D. O. plate.
	<i>Appanoose County.</i>									
1	Iconium.....	Iconium.....	Stk Co	H. A. Thompson, Sec.....	Iconium.....	Moravia.....	Jos. Elswick...	Hd.		
2	Moravia.....	Star Cheese Co.....	Stk Co	Sam Johnson, Sec.....	Moravia.....	Moravia.....	R. E. Stoops....	Hd.		
3	Moulton.....	Moulton Cheese Factory...	Ind...	A. Dickson.....	Moulton.....	Moulton.....	A. Dickson....	Hd.		
4	Ray.....	Ray Cheese Co.....	Stk Co	R. F. Main, Sec.....	Ray.....	Main Station.	Al Webster.....	Hd.		
	<i>Benton County.</i>									
5	Atkins.....	Brookside.....	Ind...	A. C. Stewart, Mgr.....	New Hall.....	Atkins.....	F. W. Johnson.	Hd.	1339	344
6	New Hall.....	Model.....	Ind...	A. C. Stewart, Mgr.....	New Hall.....	New Hall.....	J. H. Huyck....	Hd.		
7	Rogerville. ...	Excelsior Cheese Factory*.	Ind...	R. E. Fairbanks.....	Rogerville.....	Garrison.....	R. E. Fairbanks	Hd.		
	<i>Black Hawk County.</i>									
8	Waterloo.....	Waterloo Cheese Factory..	Stk Co	The Fowler Co.....	Waterloo.....	Waterloo.....	F. Wightman...	Test.		
9	Waterloo.....	Waterloo*.....	Stk Co	The Fowler Co.....	Waterloo.....	Waterloo.....	F. Wightman...	Test.		

IOWA CHEESE FACTORY LIST—CONTINUED.

Office record number.	LOCATED AT OR NEAR.	NAME OF CHEESE FACTORY.	Operated by individual, co-op or stock company.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF CHEESE-MAKER.	Method of receiving milk — by the test or by the hundred.	No. of D. O. test bottle.	No. of D. O. pl-bottle.
	<i>Bremer County.</i>									
10	Janesville	Janesville*	Stk Co	The Fowler Co.....	Waterloo.....	Janesville....	A. M. Royer....	Test.		
	<i>Clayton County.</i>									
11	Edgewood	Edgewood Cheese Factory.	Ind ...	H. E. Willard.....	Edgewood.....	Edgewood....	H. E. Willard..	Test.		
	<i>Cerro Gordo County.</i>									
12	Burchinal	Burchinal Cheese Factory.	Ind ...	T. R. Coates, Prop.....	Burchinal.....	Burchinal ..	Louis Hoffman	Hd.		
13	Mason City....	Lincoln Dairy Co.....	Co-op.	R. Pethick, Sec.....	Mason City...	Mason City...	Will Dutton...	Hd.		
	<i>Clarke County.</i>									
14	Weldon	Weldon Cheese Factory....	Ind ...	L. M. Parr & Co.....	Weldon	Weldon.....	L. M. Parr.....	Hd.		
	<i>Dallas County.</i>									
15	Woodward.....	Woodward*	Ind ...	H. P. Calonkey, Prop.....	Woodward. ...	Woodward....	A. B. Calonkey	Test.		
	<i>Decatur County.</i>									
16	Bracewell... ..	Snow's Cheese Factory.....	Ind ...	A. A. Snow, Prop	Bracewell... ..	Lineville.....	A. A. Snow.....	Hd.		
	<i>Floyd County.</i>									
17	Charles City...	Elm Spring.....	Ind ...	H. D. White, Mgr.....	Charles City...	Charles City.	H. D. White....	Hd.		
18	Charles City...	St. Charles Creamery Ass'n	Co-op.	O. Wilcox, Sec.....	Charles City...	Charles City.	F. M. Huyck...	Hd.		
	<i>Greene County.</i>									
19	Dana.....	Dana Co-op. Cr'y Co.....	Co-op	W. J. Elling, Sec.....	Dana.....	Dana.....	W. J. Elling....	Test.		

County.		Factory.	Stk Co.	The Fowler Co.....	Waterloo	Reinbeck	G. A. Place....	Test.
20	Reinbeck	Reinbeck*.....	Stk Co.	The Fowler Co.....	Waterloo	Reinbeck	G. A. Place....	Test.
<i>Guthrie County.</i>								
21	Jamaica.....	A. H. Chadsey... ..	Ind ...	A. H. Chadsey.....	Jamaica.....	Jamaica.....	A. H. Chadsey.	Hd.
<i>Hancock County.</i>								
22	Britt.....	Britt Dairy—B. & C.....	Ind ...	Geo. P. Hardwick, Prop...	Britt.	Britt	G. P. Hardwick	
<i>Hardin County.</i>								
23	Ellis.	Ellis Cheese Factory.....	Stk Co.	W. I. Clark, Mgr.....	Iowa Falls.....	Iowa Falls.....	E. Clark.....	Hd.
<i>Henry County.</i>								
24	Mt. Pleasant..	Pleasant Hill.....	Ind ...	Neal Oampbell.....	Mt. Pleasant..	Mt. Pleasant..	E. J. Elmer.	
<i>Howard County.</i>								
25	Cresco	Cresco Cheese Factory.....	Ind ...	Wm. Kellow, Jr	Oresco.....	Oresco	W. N. Lathrop	Test... 1423
26	Oresco	Olover Leaf Cheese Fact'y	Ind ...	J. J. House.....	Oresco.....	Oresco	J. J. House....	Hd.... 1447
<i>Humboldt County.</i>								
27	Renwick	Fred Klasse Factory	Ind ...	Barbara Klasse	Renwick	Renwick.....	J. Rotenbluer.	Hd.
28	Renwick	Fred Spelch	Ind ...	Fred Spelch.....	Renwick.....	Renwick.....	John Alleman.	Hd.
29	Renwick	Elmer Factory.....	Ind ...	Conrad Elmer	Renwick.....	Renwick.....	Fred Fahrney.	Hd.
<i>Jefferson County.</i>								
30	Pleasant Plain	Pleasant Plain.....	Co-op.	Joseph Glnther, Sec.....	Pleasant Plain	Pleasant Pl'n	W. J. Alter....	Test.
<i>Johnson County.</i>								
31	Iowa City.. ...	Sharon Cheese Co.....	Co-op.	J. T. Jones, Sec.....	Iowa City	Iowa City	W. D. Berkey .	Hd.
<i>Keokuk County.</i>								
32	Talleyrand....	Talleyrand	Stk Co.	L. M. Tucker, Sec.....	Talleyrand	Keota.....	O. Tucker	Test.
<i>Kossuth County.</i>								
33	Luverne.....	D. Marty's *.....	Ind ...	D. Marty	Luverne.....	Luverne.....	Mary Marty...	Hd.
34	Luverne.....	Pioneer Cheese Co.....	Stk Co.	S. B. Hefty, Sec.	Renwick.....	Luverne.....	Elbert Staffn..	Hd.

IOWA CHEESE FACTORY LIST—CONTINUED.

Office record number.	LOCATED AT OR NEAR.	NAME OF CHEESE FACTORY.	Owned by individual, co-op, or stock company.	NAME OF PROPRIETOR, SECRETARY OR MANAGER.	P. O. ADDRESS OF PROPRIETOR, SECRETARY OR MANAGER.	SHIPPING STATION.	NAME OF CHEESE-MAKER.	Method of receiving milk or by the hundred.	No. of D. O. test bottle.	No. of D. O. pl-pette.
	<i>Lee County.</i>									
26	Denmark	Denmark	Ind ..	Thos. G. Carrier	Fort Madison..	Fort Madison.	W. E. Griffith.	Hd.		
	<i>Linn County.</i>									
26	Louisa	Louisa Cheese Factory	Ind ..	R. G. Fairbank	Louisa	Louisa.	Mrs W. E. Carol	Hd.		
27	Marion	Gray's	Ind ..	Edw. J. Clark	Cedar Rapids..	Cedar Rapids.	W. E. Carol ..	Hd.		
28	Springville	Springville	Ind ..	Edw. C. Clark	Cedar Rapids..	Cedar Rapids.				
	<i>Marshall County.</i>									
29	Luray	Luray	Ind ..	Parsons Bros	Luray	Luray.	William Mayo.	Hd.		
40	La Motte	Linn Brook	Ind ..	D. Campbell, Mgr	La Motte	La Motte.				
	<i>Monroe County.</i>									
41	Albia		Ind ..		Albia	Albia.	Merle Bone	Hd.		
42	Albia		Co-op ..		Albia	Albia.	R. K. Kist	Hd.		
43	Selection		Ind ..		Albia	Albia.	S. F. Gibson	Hd.		
44	Albia		Ind ..		Albia	Albia.	Sam. G. Hinton ..	Hd.		
45	Albia		Ind ..		Albia	Albia.	J. Hollingshead ..	Hd.		
46	Albia		Ind ..		Albia	Albia.	H. Griffin	Hd.		
47	Albia		Ind ..		Albia	Albia.	Harry Parle	Hd.		
48	Albia		Ind ..		Albia	Albia.	M. E. Crouch	Hd.		
	<i>Montgomery County.</i>									
49	Grant	Grant Cheese Factory	Ind ..	John Hinton, Prop	Grant	Elliot.	John Hinton	Hd.		
	<i>Muscatine County.</i>									
50	Muscatine	Muscatine French Ch. Fac	Ind ..	Herman Schulz, Prop	Muscatine.					

Page	County.	Northboro.....	Ind...	W. H. Hatfield.	Northboro....	Northboro....	W. H. Hatfield.	Hd.	
51	Northboro....	Northboro.....	Ind...	W. H. Hatfield.	Northboro....	Northboro....	W. H. Hatfield.	Hd.	
	Poweshiek County.								
52	Grinnell	Chester Center	Ind ..	W. W. Sherman, Prop ..	Chester Center ..	Grinnell	W. W. Sherman	T&Hd 1049	271
53	Grinnell	Neely's Cheese Factory	Ind ..	J. E. Neely, Prop.....	Grinnell ..	Grinnell	J. E. Bortell...	Test.	
54	Jacobs.....	Jacobs	Ind ..	A. O. Payne, Prop.....	Jacobs	Jacobs Switch	K. Buhuly	Test.	
	Ringgold County.								
55	Mt. Ayr.....	Liberty Cheese Co	Co-op.	J. E. Main, Sec.....	Mt. Ayr.....	Mt. Ayr.....	Guy O. Imus...	Test.	
56	Tingley	Tingley Cheese Factory	Ind ..	Charles Refner..	Tingley.....	Tingley.			
	Sac County.								
57	Kiron	Otter Valley Creamery.....	Ind ..	Aug. Sundell	Kiron ..	Kiron	M. Blaser.	Test.	
58	Sac City.. ..	Blue Grass B. & O. Factory*	Ind ..	I. Hillman.....	Sac City.. ..	Sac City.....	F. Hillman		
	Story County.								
59	Ames.	I. A. O. Cheese Factory*	State..	G. L. McKay, Mgr.....	Ames.....	Ames	G. L. McKay...	Test.	
	Tama County.								
60	Dysart.....	Gold Dust Factory.....	Ind ..	B. E. Fairbanks.....	Rogerville....	Dysart.....	P. B. Fairbanks	Hd.	
	Taylor County								
61	Sharpsburg....	Sharpsburg Cheese Factory	Ind ..	Eastlack Bros., Prop'trs..	Sharpsburg...	Sharpsburg...	G. S. Eastlack.	Hd.	
62	Guss.....	Maple Grove.....	Ind ..	E. Schoonover.....	Guss.. ..	Nodaway....	E. Schoonover.	Test.	
	Warren County.								
63	Milo	Belmont Cheese Factory...	Ind ..	John Keller.....	Milo	Milo.....	John Keller ...	Hd.	
	Washington County.								
64	Olay	Olay Cheese Co	Ind ..	O. Meacham, Sec.....	Clay.....	Veo.....	O. W. Hoke ...	Test.	
65	Dublin.....	Dublin Cheese Factory...	Stk Co	H. Dickson.....	Dublin.	Washington..	M. L. Doane...	Hd.	
66	West Chester..	West Chester Cheese Fac...	Co-op.	W. E. Leet, Mgr.....	West Chester..	West Chester..	.. ..	Hd.	
	Wayne County								
67	Lineville.....	Lineville Cheese Factory..	Ind ..	Matthew De Haan.....	Lineville.. ..	Lineville.....	Mat. De Haan.	Hd.	
68	Promise City..	Promise City Cheese Co....	Co-op.	O. Frank, Sec... ..	Promise City..	Promise City..	Jas. P. Brown .	Hd.	
	Wright County								
69	Clarion.....	Wall Lake Cheese Factory.	Ind ..	Benjamin Umbreit.....	Morhain . . .	Galt.....	B. W. Umbreit.	Test .	1496 424

* Makes both butter and cheese.

INDEX.

	PAGE
PROSECUTIONS.....	5
Oleomargarine	5
Sale of adulterated milk to creameries	5
Prosecutions of city milk dealers; preservatives.....	69
CO-OPERATION IN IOWA CREAMERIES.....	6
PASTEURIZATION OF SKIMMED MILK AT CREAMERIES	8
FEED AND CARE OF COWS	8
Table of soiling crops	12
Comparative value of feed stuffs for dairy cows.....	14-16
Rations for dairy cows....	17-19
DAIRY LAWS OF IOWA.....	20
Dairy Commissioner.....	20
Imitation butter	21-22
Reports authorized and required	22
Testing milk, regulations of	22
City milk inspection.....	23
Penalties.....	23
Compensation and expenses of Dairy Commissioner.....	28
Sale of impure or adulterated milk.....	23-24
An inch of cream.....	24
OLEOMARGARINE.	
Statistics of production.....	25
Cost of making a pound of oleo.....	26
Yellow oleomargarine is a fraud.....	27
The 10-cent tax on oleomargarine.....	28
Facts and discussion.....	29
DAIRY FAKES.	
The tin can "separator"	30
Butter increasers	34
The three-minute churn	34
Preservatives in milk sold to creameries.....	35
STANDARD BOTTLES AND PIPETTES	36
MILK TESTING	36
CREAM TESTING	40
WHAT IT COSTS TO MAKE A POUND OF BUTTER	42
AVERAGE MONTHLY PRICE OF EXTRAS IN NEW YORK MARKET.....	43
FARM SEPARATORS.	
Map....	44
Table.....	45
VALUES OF CREAMERIES AND SKIM STATIONS; NUMBERS OF COWS AND PATRONS. ..	49
Comparisons of same with statistics of previous year.....	51
OWNERSHIP OF CREAMERIES, HOW OPERATED, HOW RECEIVING MILK; NEW	
CREAMERIES AND SKIM STATIONS, AND PLANTS CLOSED.....	52
Comparisons of same with statistics of previous year.....	54
WAGES OF BUTTER-MAKERS AND CHANGES IN EMPLOYMENT.....	55
DAIRY MAP OF IOWA.....	57

POUNDS OF MILK RECEIVED AND POUNDS OF BUTTER MADE, SEPARATOR AND GATHERED CREAM BUTTER, SOLD IN IOWA, SOLD TO PATRONS AND SHIPPED OUT OF THE STATE.....	58
DESTINATION OF BUTTER SHIPMENTS AS REPORTED BY CREAMERIES.....	61
FINANCIAL STATEMENT OF THE OFFICE OF DAIRY COMMISSIONER.....	63
CHEESE MAKING IN IOWA.....	64
Cheese factories, value and product.....	65
CITY MILK INSPECTION.....	67
Prosecutions, milk license cases, sale of adulterated milk; district court decision.....	69
Keeping milk in hot weather.....	74
Record of milk tests.....	75-84
RAILROAD BUTTER SHIPMENTS	85
Comparisons of total net shipments, 1890-1899	86
Gross pounds shipped out of the state for year ending October 1, 1899, increase and decrease	87
Net pounds shipped out of the state, net pounds per square mile, and rank, by counties.....	89
Twenty counties shipping greatest number of pounds per square mile....	91
Twenty counties shipping largest aggregate amounts of butter....	91
Map of butter shipments	93
CREAMERY LIST.....	94 et seq

TENTH BIENNIAL REPORT

OF THE

Commissioners of Pharmacy

FOR THE

STATE OF IOWA.

1899.

PRINTED BY ORDER OF THE GENERAL ASSEMBLY.

DES MOINES.
F. B. CONAWAY, STATE PRINTER.
1899.

LETTER OF TRANSMITTAL.

DES MOINES, Iowa, September 15, 1899.

To His Excellency, Leslie M. Shaw, Governor:

SIR—We herewith submit to you the Tenth Biennial Report of the Commissioners of Pharmacy for the State of Iowa for the official biennial period ending April 28, 1899.

W. L. LELAND,

N. T. HENDRIX,

FLETCHER HOWARD,

Commissioners.

CHARLES W. PHILLIPS,

Secretary.

TREASURER'S REPORT.

*From April 23, 1897, to April 24, 1898, of the Commissioners of Pharmacy
for the State of Iowa, Charles W. Phillips, treasurer.*

RECEIPTS

From April 23, 1897, to April 24, 1898.

356 Applications for examinations	\$ 1,780.00	
21 Applications for graduates	42.00	
16 Duplicate certificates.....	16.00	
299 Changes of locality.....	149.50	
141 Delinquent renewals.....	141.00	
2834 Renewals for 1898.....	2,834.00	
8 Certificates of percentage.....	16.00	
Total.....		\$ 4,978.50
One-third to Fletcher Howard.....	\$ 1,659.50	
One-third to W. L. Leland.....	1,659.50	
One-third to J. H. Pickett.....	1,659.50	
Total.....		\$ 4,978.50

REPORT OF SECRETARY AND TREASURER

From April 23, 1898, to April 24, 1899.

210 Applications for examinations.....	\$ 1,050 00	
93 Applications for graduates.....	186.00	
20 Duplicate certificates.....	20 00	
334 Changes of locality	166 50	
83 Delinquent renewals	86.00	
2987 Renewals for 1899	2,987.00	
8 Certificates of percentage.....	6 00	
Total.....		\$ 4,501.50
Per diem as per section 2587—Fletcher Howard.....	\$ 1,500.50	
Per diem as per section 2587—W. L. Leland.....	1,500.50	
Per diem as per section 2587—N. T. Hendrix.....	1,500 50	
Total.....		\$ 4,501.50

FINANCIAL STATEMENT, BIENNIAL PERIOD.

*From April 23, 1897, to April 23, 1899, showing all moneys received and all
moneys paid out by the office, including supplies drawn rom state, also
amount paid for printing and binding.*

	Paid out.	Received.
Secretary's salary, clerk hire and office expenses..	\$ 4,000 00	
Paid commissioners.....	9,480.00	
Supplies drawn.....	705.08	

TENTH BIENNIAL REPORT OF THE

	Paid out.	Received.
Printing.....	\$ 254.87	
Binding	240.00	
Received for licenses.....		\$ 21,200.00
Received as fees.....		9,400.00
Total.....	\$ 15,379.45	\$ 30,700.00
Net profit to state from this department	15,509.45	
Total.....	\$ 30,780.00	\$ 30,780.00
Fines collected for violation of pharmacy law and turned into the school funds of the different counties.....		\$ 10,000.00
Warrants drawn for attorneys' fees and expense of prosecutions.....		2,100.00

TREASURER'S REPORT.

Licenses issued during biennial period ending April 23, 1899.

DATE.	NAME.	Amount.
1897		
April 29	E. J. Godfrey.....	\$ 100
April 30	Samuel Galbraith.....	100
May 5	E. McConkey.....	100
May 12	F. T. Olow.....	100
May 14	J. J. McNaull.....	100
May 20	T. L. Brennan.....	100
June 15	W. D. Cahler.....	100
June 22	B. E. Benson.....	100
June 25	d.....	100
July 5		100
July 17		100
July 19		100
August 12		100
August 19		100
August 21		100
September 3		100
September 6		100
September 6		100
September 10		100
September 14		100
September 14		100
September 18		100
September 21		100
September 22		100
September 22		100
September 22		100
September 23		100
September 23		100
September 23		100
October 1		100
October 2		100
October 12		100
October 14		100
October 15		100
October 15		100
October 15		100
October 15		100
October 15	Guy Bush.....	100
October 15	L. F. Zolman.....	100
October 27	C. D. Johnson.....	100
October 27	H. A. Percival.....	100
October 27	John Peters.....	100
November 4	J. F. Dunlavy.....	100
November 11	W. E. Brown.....	100
November 17	F. M. Tuttle.....	100
November 22	J. N. Johnson.....	100
November 22	A. E. Benson.....	100
November 24	Ira Van Hees.....	100
November 26	G. Williams.....	100
December 2	A. J. Kendig.....	100
December 3	L. H. Hayes.....	100
December 7	Ray F. Ellis.....	100
December 14	George Cowling.....	100
December 24	Art Haze.....	100
December 28	C. F. Oline.....	100
January 3	Geo. Albright.....	100

COMMISSIONERS OF PHARMACY.

7

TREASURER'S REPORT.—CONTINUED.

DATE.	NAME.	Amount.
1896.		
January 6	Is	100
January 7	A.	100
January 20	O.	100
January 28	H.	100
January 28	U.	100
January 28	W.	100
January 28	M.	100
January 28	F.	100
January 28	E.	100
February 4	E.	100
February 8	E.	100
February 10	H.	100
February 10	E.	100
February 15	J.	100
February 15	O.	100
February 17	J.	100
February 17	C.	100
February 17	R.	100
February 23	F.	100
February 26	J.	100
February 28	C.	100
March 2	O.	100
March 2	W.	100
March 4	A.	100
March 8	F.	100
March 8	J.	100
March 9	G.	100
March 12	G.	100
March 16	W.	100
March 16	A.	100
March 17	J.	100
March 18	O.	100
March 18	J.	100
March 18	B.	100
March 21	F.	100
March 23	W.	100
March 23	E.	100
March 23	H.	100
March 31	H.	100
April 5	J.	100
April 5	P.	100
April 8	H.	100
April 8	C.	100
April 11	H.	100
April 11	J.	100
April 13	W.	100
April 15	E.	100
April 21	D.	100
April 25	J.	100
April 26	L.	100
April 26	E.	100
April 30	S.	100
May 6	J.	100
May 6	J.	100
May 13	J.	100
May 17	J.	100
May 19	O.	100
May 19	A.	100
May 23	J.	100
May 31	D.	100
June 10	F.	100
June 12	W.	100
June 21	M.	100
July 1	E.	100
July 1	E.	100
July 1	B.	100
July 1	F.	100
July 1	W.	100
July 2	A.	100
July 9	F.	100
July 9	F.	100
July 12	C.	100
July 19	W.	100

TENTH BIENNIAL REPORT OF THE
TREASURER'S REPORT.—CONTINUED.

[illegible]

COMMISSIONERS OF PHARMACY.

9

TREASURER'S REPORT.—CONTINUED.

DATE.	NAME.	Amount.
April 8	J. P. A. H. O. H. E. R. T. A. W. F.	\$ 100
April 8	J. P. A. H. O. H. E. R. T. A. W. F.	100
April 8	J. P. A. H. O. H. E. R. T. A. W. F.	100
April 8	J. P. A. H. O. H. E. R. T. A. W. F.	100
April 14	J. P. A. H. O. H. E. R. T. A. W. F.	100
April 14	J. P. A. H. O. H. E. R. T. A. W. F.	100
April 14	J. P. A. H. O. H. E. R. T. A. W. F.	100
April 14	J. P. A. H. O. H. E. R. T. A. W. F.	100
April 18	J. P. A. H. O. H. E. R. T. A. W. F.	100
April 18	J. P. A. H. O. H. E. R. T. A. W. F.	100
April 18	J. P. A. H. O. H. E. R. T. A. W. F.	100
April 21	J. P. A. H. O. H. E. R. T. A. W. F.	100
Total.....		\$21,200

EXPENSE ACCOUNT OF COMMISSION.

From April 23, 1897, to April 23, 1898.

DATE.	NAME.	AMOUNT.
1897.		
June 8	Charles W. Phillips.....	\$ 100 00
June 20	Charles W. Phillips.....	100 00
July 21	W. F. Giesseman.....	4 80
July 21	Charles W. Phillips.....	100 00
September 11	Charles W. Phillips.....	100 00
September 18	Anna Bromley.....	5 00
September 20	Charles W. Phillips.....	100 00
October 11	J. H. Pickett.....	120 00
October 11	Charles W. Phillips.....	17 80
October 11	Fletcher Howard.....	74 50
October 11	W. L. Leland.....	28 32
November 4	Charles W. Phillips.....	100 00
November 20	Charles W. Phillips.....	100 00
December 21	Anna Bromley.....	5 00
December 21	Charles W. Phillips.....	100 00
1898.		
January 4	W. F. Giesseman.....	8 60
January 7	L. A. Holmes.....	40 00
January 22	Fletcher Howard.....	45 05
January 22	J. H. Pickett.....	95 73
January 22	W. L. Leland.....	79 08
January 21	Charles W. Phillips.....	100 00
February 26	Charles W. Phillips.....	100 00
March 21	Charles W. Phillips.....	100 00
April 22	L. A. Holmes.....	10 00
April 22	Anna Bromley.....	20 00
April 22	W. F. Giesseman.....	15 27
April 22	Fletcher Howard.....	38 25
April 22	Charles W. Phillips.....	5 00
April 22	W. L. Leland.....	18 48
April 22	J. H. Pickett.....	32 90
April 22	Charles W. Phillips.....	100 96
Total.....		\$ 2,000 00

TENTH BIENNIAL REPORT OF THE
EXPENSE ACCOUNT OF COMMISSION.
From April 23, 1898, to April 23, 1899.

DATE.	NAME.	AMOUNT.
1898.		
June 1	O. O. ps.....	\$ 100.00
July 1	O. O. ps.....	100.00
July 27	J. A. ps.....	10.00
July 27	A. ps.....	7.86
August 11	N. W. ps.....	48.88
August 11	N. W. ps.....	57.12
August 11	F. rd.....	80.00
August 11	W. n.....	9.63
August 11	O. ps.....	100.00
August 11	C. ps.....	21.76
September 6	Chas. W. Phillips.....	100.00
September 30	Jennie Wharton.....	10.00
September 30	Chas. W. Phillips.....	100.00
October 17	J. O. Simpson.....	50.00
November 1	Fletcher Howard.....	22.05
November 1	N. T. Hendrix.....	31.48
November 1	Chas. W. Phillips.....	100.00
November 1	W. L. Leland.....	30.23
November 13	J. O. Simpson.....	40.00
November 20	Chas. W. Phillips.....	100.00
December 21	Chas. W. Phillips.....	100.00
1899.		
January 9	W. F. Giesseman.....	8.75
January 31	Chas. W. Phillips.....	100.00
February 7	N. T. Hendrix.....	20.71
February 7	W. L. Leland.....	30.23
February 7	Fletcher Howard.....	25.45
February 7	Chas. W. Phillips.....	8.87
February 28	Chas. W. Phillips.....	100.00
March 31	Chas. W. Phillips.....	100.00
April 21	W. F. Giesseman.....	9.63
April 23	W. L. Leland.....	80.15
April 23	N. T. Hendrix.....	80.84
April 23	Fletcher Howard.....	41.36
April 23	Chas. W. Phillips.....	100.00
April 23	L. Harbach.....	22.75
April 23	O. Dahlberg.....	85.00
April 23	Jennie Wharton.....	8.57
	Total.....	\$ 2,000.00

COMMISSIONERS OF PHARMACY.

11

PERMITS IN FORCE SEPTEMBER 1, 1899.

COUNTY.	No. permits reported.	COUNTY.	No. permits reported.	COUNTY.	No. permits reported.
Adair	5	W	15	Monona	4
Adams	5	A.	11	Monroe	7
Allamakee	4	F	5	Montgomery	5
Appanoose	6		12	Muscatine	5
Audubon	9	G	6	O'Brien	8
Benton	18	G	8	Oceola	7
Black Hawk	10	H	14	Page	6
Boone	10	H	14	Palo Alto	7
Bremer	5	H	23	Plymouth	9
Buchanan	15	H	6	Pocahontas	10
Buena Vista	10	H	18	Polk	23
Butler	11	H	9	Pottawattamie	3
Calhoun	11	H	15	Poweshiek	3
Carroll	3	I	3	Ringgold	4
Cass	10	I	12	Sac	14
Cedar	6	J	5	Scott	1
Cerro Gordo	11	J	11	Shelby	7
Cherokee	7	J	7	Slous	14
Chickasaw	6	J	4	Story	14
Clarke	4	J	15	Tama	6
Clay	3	K	18	Taylor	4
Clayton	13	K	21	Union	12
Clinton	6	L	11	Van Buren	18
Crawford	4	L	18	Wasello	2
Dallas	12	L	6	Warren	8
Davis	1	Lucas	5	Washington	17
Decatur	7	Lyon	3	Wayne	6
Delaware	10	Madison	3	Webster	11
Des Moines	5	Mahaska	12	Winnebago	14
Dickinson	5	Marion	10	Winnebalek	4
Dubuque	8	Marshall	19	Woodbury	16
Emmet	5	Mills	7	Worth	
Fayette	16	Mitchell	8	Wright	
Total number granted in state				207	

ABSTRACT OF STATE PHARMACY REGISTER.

Showing certificates now in force.

Number of certificate.	NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
151	Area, David.....	June 14, 1890	As owner.....	Donnellson.....	Red Oak.....	Sept. 10, 1890	
202	June 21, 1890	As assistant.....	.....	.....	.....
225	June 8, 1890	As owner.....	.....	.....	.....
229	June 4, 1890	As owner.....	.....	.....	.....
1134	July 7, 1890	As owner.....	.....	.....	.....
1204	June 15, 1890	As owner.....	.....	.....	.....
1294	June 13, 1890	As owner.....	.....	.....	.....
1395	H.....	Aug. 12, 1890	As owner.....	.....	.....	.....
1397	July 20, 1890	By examination.....	.....	Adair.....	April 5, 1890	Out of business.
1600	July 7, 1890	By examination.....	.....	Fort Madison.....	Nov. 5, 1890	
1700	Aug. 4, 1890	By examination.....	.....	Stacyville.....	Sept. 27, 1890	
1724	P.....	Oct. 1, 1890	By examination.....	.....	Waverly.....	Mar. 23, 1891	
1801	Oct. 5, 1890	By examination.....	.....	.....	.....
2011	April 27, 1891	By examination.....	Manson.....	Cameron, Mo.....	Mar. 19, 1892	
2290	Oct. 14, 1891	By examination.....	Leon.....	Kalona.....	Oct. 1, 1892	
2341	H.....	Sept. 10, 1891	By examination.....	Webster City.....	.....	Oct. 1, 1892	
2470	May 8, 1892	By examination.....	Cedar Rapids.....	.....	Mar. 24, 1894	
2504	Aug. 1, 1892	By examination.....	Cambridge.....	.....	.....
2544	Oct. 21, 1892	By examination.....	Marion.....	.....	.....
2581	Feb. 28, 1893	By examination.....	Logan.....	.....	.....
2605	April 17, 1893	By examination.....	De Koto.....	Yale.....	May 20, 1895	
2726	July 17, 1893	By examination.....	Des Moines.....	Lyons.....	April 16, 1896	
2739	Mar. 6, 1894	By examination.....	Hurleston.....	.....	.....
2750	April 15, 1894	By examination.....	Earville.....	Manchester.....	Oct. 31, 1896	
3120	Feb. 28, 1897	By examination.....	Tingley.....	.....	.....
3126	Mar. 1, 1897	By examination.....	Carroll.....	Coon Rapids.....	Oct. 19, 1897	
3146	Mar. 11, 1897	By examination.....	Shenfeld.....	Des Moines.....	Oct. 31, 1898	
3211	April 15, 1897	By examination.....	Mason City.....	.....	.....
3250	May 17, 1897	By examination.....	Council Bluffs.....	.....	.....
3317	Sept. 20, 1897	By examination.....	Mason City.....	.....	.....
3328	Oct. 8, 1897	As graduate.....	Schaller.....	.....	.....
445	April 17, 1898	By examination.....	Sheldon.....	Sioux City.....	.....	Lamar, Mo.
446	June 5, 1898	By examination.....	Nesman.....	.....	.....
2604	Aug. 31, 1898	By examination.....	.....	.....	.....

2693	.....	Dec. 20, 1893	.....	Des Moines.....	July 2, 1894	.....
2694	.....	April 10, 1893	.....	Wabeno, Wis.	July 16, 1894	.....
2695	.....	May 20, 1893	.....	Winnetka, Ill.	.....	.....
2696	.....	July 20, 1893	.....	Manchester.....	.....	.....
2697	.....	Jan. 7, 1894	.....	Manchester.....	Dec. 1, 1893	.....
2698	.....	Jan. 7, 1894	.....	Manchester.....	Feb. 17, 1893	.....
2699	.....	Jan. 21, 1894	.....	Wabeno, Wis.	.....	In Missouri.
2700	.....	Oct. 31, 1893	.....	St. Charles.....	.....	.....
2701	.....	Jan. 31, 1894	.....	St. Charles.....	Jan. 12, 1893	.....
2702	.....	April 7, 1894	.....	Strawberry Point.....	.....	.....
2703	.....	April 15, 1894	.....	Strawberry Point.....	.....	.....
2704	.....	Aug. 15, 1893	.....	Bellevue.....	May 23, 1893	.....
2705	.....	Nov. 5, 1893	.....	Bellevue.....	Oct. 31, 1897	.....
2706	.....	Nov. 5, 1893	.....	Hannston.....	.....	Out of state.
2707	.....	April 15, 1893	.....	Hannston.....	.....	.....
2708	.....	April 15, 1893	.....	Maum City.....	.....	.....
2709	.....	May 10, 1893	.....	Maum City.....	.....	.....
2710	.....	May 10, 1893	.....	Maum City.....	.....	.....
2711	.....	July 7, 1893	.....	Maum City.....	.....	.....
2712	.....	July 7, 1893	.....	Maum City.....	.....	.....
2713	.....	July 7, 1893	.....	Maum City.....	.....	.....
2714	.....	July 7, 1893	.....	Maum City.....	.....	.....
2715	.....	July 7, 1893	.....	Maum City.....	.....	.....
2716	.....	July 7, 1893	.....	Maum City.....	.....	.....
2717	.....	July 7, 1893	.....	Maum City.....	.....	.....
2718	.....	July 7, 1893	.....	Maum City.....	.....	.....
2719	.....	July 7, 1893	.....	Maum City.....	.....	.....
2720	.....	July 7, 1893	.....	Maum City.....	.....	.....
2721	.....	July 7, 1893	.....	Maum City.....	.....	.....
2722	.....	July 7, 1893	.....	Maum City.....	.....	.....
2723	.....	July 7, 1893	.....	Maum City.....	.....	.....
2724	.....	July 7, 1893	.....	Maum City.....	.....	.....
2725	.....	July 7, 1893	.....	Maum City.....	.....	.....
2726	.....	July 7, 1893	.....	Maum City.....	.....	.....
2727	.....	July 7, 1893	.....	Maum City.....	.....	.....
2728	.....	July 7, 1893	.....	Maum City.....	.....	.....
2729	.....	July 7, 1893	.....	Maum City.....	.....	.....
2730	.....	July 7, 1893	.....	Maum City.....	.....	.....
2731	.....	July 7, 1893	.....	Maum City.....	.....	.....
2732	.....	July 7, 1893	.....	Maum City.....	.....	.....
2733	.....	July 7, 1893	.....	Maum City.....	.....	.....
2734	.....	July 7, 1893	.....	Maum City.....	.....	.....
2735	.....	July 7, 1893	.....	Maum City.....	.....	.....
2736	.....	July 7, 1893	.....	Maum City.....	.....	.....
2737	.....	July 7, 1893	.....	Maum City.....	.....	.....
2738	.....	July 7, 1893	.....	Maum City.....	.....	.....
2739	.....	July 7, 1893	.....	Maum City.....	.....	.....
2740	.....	July 7, 1893	.....	Maum City.....	.....	.....
2741	.....	July 7, 1893	.....	Maum City.....	.....	.....
2742	.....	July 7, 1893	.....	Maum City.....	.....	.....
2743	.....	July 7, 1893	.....	Maum City.....	.....	.....
2744	.....	July 7, 1893	.....	Maum City.....	.....	.....
2745	.....	July 7, 1893	.....	Maum City.....	.....	.....
2746	.....	July 7, 1893	.....	Maum City.....	.....	.....
2747	.....	July 7, 1893	.....	Maum City.....	.....	.....
2748	.....	July 7, 1893	.....	Maum City.....	.....	.....
2749	.....	July 7, 1893	.....	Maum City.....	.....	.....
2750	.....	July 7, 1893	.....	Maum City.....	.....	.....
2751	.....	July 7, 1893	.....	Maum City.....	.....	.....
2752	.....	July 7, 1893	.....	Maum City.....	.....	.....
2753	.....	July 7, 1893	.....	Maum City.....	.....	.....
2754	.....	July 7, 1893	.....	Maum City.....	.....	.....
2755	.....	July 7, 1893	.....	Maum City.....	.....	.....
2756	.....	July 7, 1893	.....	Maum City.....	.....	.....
2757	.....	July 7, 1893	.....	Maum City.....	.....	.....
2758	.....	July 7, 1893	.....	Maum City.....	.....	.....
2759	.....	July 7, 1893	.....	Maum City.....	.....	.....
2760	.....	July 7, 1893	.....	Maum City.....	.....	.....
2761	.....	July 7, 1893	.....	Maum City.....	.....	.....
2762	.....	July 7, 1893	.....	Maum City.....	.....	.....
2763	.....	July 7, 1893	.....	Maum City.....	.....	.....
2764	.....	July 7, 1893	.....	Maum City.....	.....	.....
2765	.....	July 7, 1893	.....	Maum City.....	.....	.....
2766	.....	July 7, 1893	.....	Maum City.....	.....	.....
2767	.....	July 7, 1893	.....	Maum City.....	.....	.....
2768	.....	July 7, 1893	.....	Maum City.....	.....	.....
2769	.....	July 7, 1893	.....	Maum City.....	.....	.....
2770	.....	July 7, 1893	.....	Maum City.....	.....	.....
2771	.....	July 7, 1893	.....	Maum City.....	.....	.....
2772	.....	July 7, 1893	.....	Maum City.....	.....	.....
2773	.....	July 7, 1893	.....	Maum City.....	.....	.....
2774	.....	July 7, 1893	.....	Maum City.....	.....	.....
2775	.....	July 7, 1893	.....	Maum City.....	.....	.....
2776	.....	July 7, 1893	.....	Maum City.....	.....	.....
2777	.....	July 7, 1893	.....	Maum City.....	.....	.....
2778	.....	July 7, 1893	.....	Maum City.....	.....	.....
2779	.....	July 7, 1893	.....	Maum City.....	.....	.....
2780	.....	July 7, 1893	.....	Maum City.....	.....	.....
2781	.....	July 7, 1893	.....	Maum City.....	.....	.....
2782	.....	July 7, 1893	.....	Maum City.....	.....	.....
2783	.....	July 7, 1893	.....	Maum City.....	.....	.....
2784	.....	July 7, 1893	.....	Maum City.....	.....	.....
2785	.....	July 7, 1893	.....	Maum City.....	.....	.....
2786	.....	July 7, 1893	.....	Maum City.....	.....	.....
2787	.....	July 7, 1893	.....	Maum City.....	.....	.....
2788	.....	July 7, 1893	.....	Maum City.....	.....	.....
2789	.....	July 7, 1893	.....	Maum City.....	.....	.....
2790	.....	July 7, 1893	.....	Maum City.....	.....	.....
2791	.....	July 7, 1893	.....	Maum City.....	.....	.....
2792	.....	July 7, 1893	.....	Maum City.....	.....	.....
2793	.....	July 7, 1893	.....	Maum City.....	.....	.....
2794	.....	July 7, 1893	.....	Maum City.....	.....	.....
2795	.....	July 7, 1893	.....	Maum City.....	.....	.....
2796	.....	July 7, 1893	.....	Maum City.....	.....	.....
2797	.....	July 7, 1893	.....	Maum City.....	.....	.....
2798	.....	July 7, 1893	.....	Maum City.....	.....	.....
2799	.....	July 7, 1893	.....	Maum City.....	.....	.....
2800	.....	July 7, 1893	.....	Maum City.....	.....	.....

713	June 8, 1890	As owner	Coleburg.	Mar. 21, 1899		
714	June 20, 1890	As assistant	Davenport.	Sept. 21, 1898		
715	July 20, 1890	As owner	Spirit Lake.			
716	June 20, 1890	As assistant	Leville.			
717	June 20, 1890	As assistant	Cedar Rapids.			
718	July 1, 1890	As owner	Monticello.			
719	June 14, 1890	As assistant	Van Wert.			
720	June 7, 1890	As owner	Reaman.			
721	June 7, 1890	As owner	New Hampton.			
722	June 7, 1890	As owner	Nevada.			
723	June 27, 1890	As owner	Nora Springs.			
724	June 6, 1890	As owner	Oskaloosa.	May 2, 1899		
725	July 7, 1890	As owner	Nora Springs.	Sept. 9, 1891		
726	July 7, 1890	As owner	Dubuque.			
727	July 7, 1890	As owner	State Center.	June 13, 1893		
728	June 8, 1890	As owner	State Center.	July 15, 1899		
729	June 7, 1890	As owner	Troy Mills.			
730	June 7, 1890	As owner	Vinton.			
731	June 4, 1890	As owner	Pella.			
732	June 4, 1890	As owner	Walnut.			
733	July 24, 1890	As owner	Edgewood.			
734	July 24, 1890	As owner	Edgewood.			
735	July 24, 1890	As owner	Xenia.			
736	Aug. 18, 1890	As owner	Waverly.			
737	Aug. 2, 1890	By examination.	Des Moines.	Mar. 17, 1895		
738	Aug. 2, 1890	As assistant.	Waverly.			
739	Aug. 2, 1890	As owner	Des Moines.			
740	Nov. 2, 1890	As assistant.	Wyoming.			
741	Nov. 2, 1890	As owner	Kinross.			
742	Oct. 19, 1890	By examination.	Oskaloosa.	June 1, 1899		
743	Oct. 19, 1890	By examination.	De Soto.			
744	Sept. 15, 1890	By examination.	Estherville.			
745	Aug. 12, 1890	By examination.	Ottumwa.			
746	Aug. 11, 1890	By examination.	Fonda.	May 2, 1899		
747	Nov. 15, 1890	By examination.	Washington.	Aug. 23, 1899		
748	Nov. 24, 1890	By examination.	Bonaparte.			
749	Dec. 21, 1890	As owner	Tipton.			
750	April 7, 1891	By examination.	Holland.	May 12, 1899		
751	Feb. 7, 1891	By examination.	Muscatinge.			
752	June 20, 1891	By examination.	Charlinda.			
753	July 26, 1891	By examination.	Holland.	Mar. 20, 1899		
754	Aug. 2, 1891	By examination.	Council Bluffs.	Feb. 23, 1899		
755	Aug. 2, 1891	By examination.	Canton.			
756	Sept. 7, 1891	By examination.	Wesley.			
757	Oct. 19, 1891	By examination.	Trass.	Sept. 20, 1891		
758	Jan. 9, 1892	By examination.	Marshalltown.	June 9, 1895		
759	Jan. 24, 1891	By examination.	Leroy.	Sept. 24, 1897		
760	Feb. 25, 1892	By examination.	Waverly.			
761	Jan. 31, 1893	By examination.	Ohio.			
762	June 8, 1890	As owner	Coleburg.			
763	June 20, 1890	As assistant	Davenport.			
764	July 20, 1890	As owner	Spirit Lake.			
765	June 20, 1890	As assistant	Leville.			
766	June 20, 1890	As assistant	Cedar Rapids.			
767	July 1, 1890	As owner	Monticello.			
768	June 14, 1890	As assistant	Van Wert.			
769	June 7, 1890	As owner	Reaman.			
770	June 7, 1890	As owner	New Hampton.			
771	June 7, 1890	As owner	Nevada.			
772	June 27, 1890	As owner	Nora Springs.			
773	June 6, 1890	As owner	Oskaloosa.	May 2, 1899		
774	July 7, 1890	As owner	Nora Springs.	Sept. 9, 1891		
775	July 7, 1890	As owner	Dubuque.			
776	July 7, 1890	As owner	State Center.	June 13, 1893		
777	June 8, 1890	As owner	State Center.	July 15, 1899		
778	June 7, 1890	As owner	Troy Mills.			
779	June 7, 1890	As owner	Vinton.			
780	June 4, 1890	As owner	Pella.			
781	June 4, 1890	As owner	Walnut.			
782	July 24, 1890	As owner	Edgewood.			
783	July 24, 1890	As owner	Edgewood.			
784	July 24, 1890	As owner	Xenia.			
785	Aug. 18, 1890	As owner	Waverly.			
786	Aug. 2, 1890	By examination.	Des Moines.	Mar. 17, 1895		
787	Aug. 2, 1890	As assistant.	Waverly.			
788	Nov. 2, 1890	As owner	Des Moines.			
789	Nov. 2, 1890	As assistant.	Wyoming.			
790	Oct. 19, 1890	By examination.	Oskaloosa.	June 1, 1899		
791	Oct. 19, 1890	By examination.	De Soto.			
792	Sept. 15, 1890	By examination.	Estherville.			
793	Aug. 12, 1890	By examination.	Ottumwa.			
794	Aug. 11, 1890	By examination.	Fonda.	May 2, 1899		
795	Nov. 15, 1890	By examination.	Washington.	Aug. 23, 1899		
796	Nov. 24, 1890	By examination.	Bonaparte.			
797	Dec. 21, 1890	As owner	Tipton.			
798	April 7, 1891	By examination.	Holland.	May 12, 1899		
799	Feb. 7, 1891	By examination.	Muscatinge.			
800	June 20, 1891	By examination.	Charlinda.			
801	July 26, 1891	By examination.	Holland.	Mar. 20, 1899		
802	Aug. 2, 1891	By examination.	Council Bluffs.	Feb. 23, 1899		
803	Aug. 2, 1891	By examination.	Canton.			
804	Sept. 7, 1891	By examination.	Wesley.			
805	Oct. 19, 1891	By examination.	Trass.	Sept. 20, 1891		
806	Jan. 9, 1892	By examination.	Marshalltown.	June 9, 1895		
807	Jan. 24, 1891	By examination.	Leroy.	Sept. 24, 1897		
808	Feb. 25, 1892	By examination.	Waverly.			
809	Jan. 31, 1893	By examination.	Ohio.			

Out of business.
Out of business.

Out of business.

ABSTRACT—CONTINUED.

Number of certificate.	NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
2405	Brittan, S. P.	April 25, 1892	By examination.	Rockford	Mason City	April 16, 1894	Out of business.
2406		May 24, 1892	By	Glyde	Lyverne	Dec. 31, 1894	
2407		May 17, 1892	By	Marengo	Ladors	Dec. 17, 1895	
2408		June 20, 1892	By	Woodburn			
2409		July 11, 1892	By	West Bend			
2410		Aug. 8, 1892	By	Des Moines			
2411		Sept. 6, 1892	By	Gallop			
2412		Sept. 14, 1892	By	Whiteland	Keystone	Jan. 3, 1897	Out of business.
2413		Sept. 14, 1892	By	Marshalltown	Galva	Feb. 10, 1896	Washington.
2414		Dec. 16, 1892	By	Harard			
2415		Jan. 16, 1893	By	Defiance			
2416		April 20, 1893	By	Irwin			
2417		June 20, 1893	By	Red Oak	Stonx City	Mar. 24, 1896	Out of business.
2418		Nov. 20, 1893	By	Afton	Owston	May 1, 1896	
2419		Feb. 16, 1894	By	Fayette	Lake City	Jan. 1, 1896	
2420		Sept. 7, 1894	By	Red City			
2421		Oct. 7, 1894	By	Lenox			
2422		Dec. 20, 1894	By	Afton			
2423		Jan. 14, 1895	By	Ames			
2424		May 24, 1895	By	Bloomfield	Humeston	Mar. 14, 1896	Out of business.
2425		Sept. 7, 1895	By	Cedar Rapids			
2426		Nov. 3, 1895	By	Centerville			
2427		Jan. 12, 1896	By	Pulaski	Farmington	Nov. 4, 1896	
2428		Feb. 5, 1896	By	West Union	Ft. Madison	Nov. 1, 1896	
2429		Mar. 16, 1896	By	Lisbon			
2430		May 18, 1896	By	Iowa City	Webster City	June 9, 1896	Out of business.
2431		July 27, 1896	By examination.	Mapleton	Clear Lake		
2432		Sept. 15, 1896	By	Des Moines	Defiance	Nov. 16, 1896	
2433		Sept. 20, 1896	By	Des Moines			
2434		Dec. 7, 1896	By	Albia			
2435		Mar. 23, 1897	By	Muscatine			
2436		Jan. 24, 1897	By	West Union			
2437		Mar. 16, 1897	By	Quasqueton	Thurmas	Mar. 12, 1899	In Massachusetts.
2438		Mar. 21, 1897	By	Oeslin			
2439		Feb. 14, 1897	By	Council Bluffs			
2440		Feb. 26, 1897	By	Allison			
2441		Feb. 26, 1897	By	Vinton			

1833	Boeser, Ed. A.	Feb. 25, 1887	Iowa City.	Brayton.....	June 15, 1887	
1843		Mar. 15, 1887	Council Bluffs.			
1844		Mar. 15, 1887	Marwell.			
1845		Mar. 15, 1887	Des Moines.			
1846		Apr. 15, 1887	Audubon.			
1847		Apr. 15, 1887	Dubuque.			
1848		May 17, 1887	Bancroft.			
1849		July 7, 1887	Iowa City.			
1850		July 12, 1887	Denison.			
1851		July 12, 1887	Cherokee.			
1852		Aug. 15, 1887	Sattle Creek.			
1853		Aug. 15, 1887	Mason City.			
1854		Sept. 9, 1887	De Witt.			
1855		Sept. 9, 1887	Clinton.			
1856		Nov. 15, 1887	Chariton.			
1857		Jan. 4, 1888	Cedar Falls.			
1858		Feb. 22, 1888	Fonda.			
1859		Mar. 20, 1888	Des Moines.			
1860		Mar. 27, 1888	Postville.			
1861		Mar. 28, 1888	Stout City.			
1862		Mar. 28, 1888	Stout City.			
1863		Apr. 17, 1888	Colfax.			
1864		May 15, 1888	Boyd.			
1865		May 15, 1888	Oto.			
1866		July 17, 1888	Essex.			
1867		Aug. 28, 1888	Winterset.			
1868		Aug. 28, 1888	Rockford.			
1869		Sept. 4, 1888	Moulton.			
1870		Sept. 4, 1888	Marango.			
1871		Oct. 15, 1888	Shellsburg.			
1872		Jan. 25, 1889	Dunlap.			
1873		Jan. 14, 1889	Kellogg.			
1874		Feb. 11, 1889	Uresla.			
1875		Feb. 12, 1889	Nashua.			
1876		Mar. 19, 1889	Elkader.			
1877		May 15, 1889	Allison.			
1878		June 4, 1889	Spencer.			
1879		July 22, 1889	Maquoketa.			
1880		Aug. 10, 1889	Waverly.			
1881		Aug. 22, 1889	Waverly.			
1882		Aug. 22, 1889	Waverly.			
1883		Oct. 1, 1889	Brandon.			
1884		Oct. 22, 1889	Chariton.			
1885		Nov. 26, 1889	Prairie Grove.			
1886		Dec. 14, 1889	Onslow.			
1887		Dec. 14, 1889	West Side.			
1888		Dec. 14, 1889	Cedar Falls.			
1889		Jan. 15, 1890	Mapleton.			
1890		Jan. 21, 1890	Marwell.			
1891		Feb. 8, 1890	State Center.			
1892		Feb. 12, 1890	Ransom.			
1893		Mar. 15, 1890				
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Out of business.
Out of business.

In South Dakota
In Wisconsin.

In Quincy, Ill.
Out of business.
In Nebraska.

Out of business.

ABSTRACT--CONTINUED.

Number of certificate.	NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
2559	Briggs, George H.	Mar. 2, 1900	Graduate.	Nevada.			
2560		Mar. 5, 1900	Graduate.	Pella.			
2577		April 15, 1900	Graduate.	West Branch.			
2589		May 6, 1900	Graduate.	Moulton	Panama	Aug. 16, 1900	
2592		May 20, 1900	Graduate.	Marengo.			
2594		Aug. 20, 1900	By examination.	Sioux City.			
2638		Sept. 19, 1900	By examination.	Fonda.	Everly	Jan. 13, 1901	
2671		Jan. 2, 1901	By examination.	Rodney	Buck Grove.	Dec. 2, 1901	
2683		Jan. 21, 1901	By examination.	Oedar Rapids	Iowa Falls.	June 20, 1901	
2693		Mar. 2, 1901	By examination.	Toledo.			
4000		Mar. 2, 1901	By examination.	Riverside.	Lone Tree.	July 22, 1905	
4004		Mar. 7, 1901	By examination.	Elkader.			
4024	T.	April 6, 1901	By examination.	Sigourney.	Mason City.	July 22, 1906	
4033		May 8, 1901	By examination.	Oto.			
4036		May 19, 1901	By examination.	Spirit Lake			
4052		June 1, 1901	By examination.		Lake Park.	Aug. 22, 1906	
4053		June 2, 1901	By examination.				
4054		Aug. 1, 1901	By examination.		Prairieburg	Jan. 14, 1907	
4054	F.	Sept. 1, 1901	By examination.		Mc. Pleasant.	Oct. 7, 1907	
4113	L.	Oct. 21, 1901	By examination.		Maquoketa.		
4126	Q.	Nov. 20, 1901	By examination.				
4148		Nov. 20, 1901	By examination.				
4149		Dec. 1, 1901	By examination.				
4174		Feb. 2, 1902	By examination.		Nowell	June 7, 1907	
4184		Feb. 12, 1902	By examination.		Oakloosa.	June 6, 1907	
4187		Feb. 24, 1902	By examination.				
4188		Feb. 26, 1902	By examination.			Jan. 11, 1908	
4206	P.	Mar. 20, 1902	By examination.			Jan. 2, 1908	
4215		April 5, 1902	By examination.		Rose Hill.	Dec. 20, 1908	Out of business.
4226		May 17, 1902	By examination.		Oakloosa	Aug. 27, 1904	
4241		June 7, 1902	By examination.		West Bend.	Mar. 20, 1908	Out of business.
4261		June 27, 1902	Graduate.				
4268	L.	June 7, 1902	By examination.		Mount Auburn	April 2, 1908	
4280		July 1, 1902	Graduate.				
4281		Aug. 2, 1902	By examination.		Richland	Sept. 11, 1908	
4281		Aug. 2, 1902	By examination.				

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ABSTRACT—Continued.

NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
Boyson, G. H.	Feb. 4, 1896	By examination.	Cedar Falls, Iowa.	Cedar Rapids.	Aug. 20, 1896	
4085	Feb. 4, 1896		Burlington.			
4086	Feb. 4, 1896		Leavenworth.			
5003	Mar. 2, 1896		Knoxville.	Wellman.	Feb. 17, 1897	
5019	Mar. 2, 1896		Indianapolis.	Blackburg.	Nov. 24, 1896	
5045	Apr. 7, 1896		Newark.	Monroeville.	Jan. 2, 1898	
5057	Apr. 7, 1896		Northwood.	Lake Mills.	Jan. 26, 1898	
5067	May 5, 1896		Strawberry Point.			
5103	May 5, 1896		Chicago.			
5109	July 7, 1896		Marshalltown.	Lake Park.	Sept. 6, 1897	
5141	July 7, 1896		Wayland.	Lawrence City, Neb.		
5143	Sept. 1, 1896		Lowell.			
5173	Sept. 1, 1896		Ginnell.			
5177	Nov. 10, 1896		Bellevue.			
5188	Dec. 1, 1896		Rockford.			
5210	Dec. 1, 1896		De Witt.			
5244	Jan. 12, 1897		Boone.			
5247	Mar. 2, 1897		Davenport.	Maquoketa.	Nov. 19, 1897	
5248	Mar. 2, 1897		Des Moines.			
5255	Apr. 6, 1897		Wapello.			
5257	Apr. 6, 1897		Lowell.			
5258	Apr. 6, 1897		Conrad.	Ft. Dodge.	May 8, 1897	
5259	Apr. 6, 1897		East Nation.	Charter Oak.	Mar. 28, 1898	
5260	May 1, 1897		Northwood.			
5261	May 1, 1897		Ruthven.			
5262	June 1, 1897		Oklaheka.			
5263	June 1, 1897		Draverville.	Farley.	Nov. 9, 1897	
5264	Aug. 2, 1897		Schaller.			
5265	Aug. 2, 1897		Webster City.			
5266	Aug. 2, 1897		Des Moines.	Anamosa.	Aug. 8, 1898	
5267	Aug. 2, 1897		Wentz.	Bloomfield.	Jan. 21, 1898	
5268	Sept. 1, 1897		Goodall.	Kennedy.	Jan. 11, 1898	
5269	Oct. 1, 1897		Leola.			
5270	Oct. 1, 1897		Olin.			
5271	Nov. 4, 1897		Sioux City.	Des Moines.	Dec. 7, 1897	
5272	Nov. 4, 1897		Monticello.			

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ABSTRACT—CONTINUED.

Number of certificate.	NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
707	Camp, America.....	June 4, 1890	As owner.....	Kellerton.			
708		June 4, 1890	As owner.....	Kellerton.			
709		June 5, 1890	As owner.....	Marquette.			
710		July 5, 1890	As assistant.....	Burlington.			
1077		June 16, 1890	As assistant.....	Ottumwa.			
1151		July 5, 1890	As owner.....	Leona.			
1252		June 9, 1890	As owner.....	Leona City.			
1300		June 18, 1890	As owner.....	Washington.			
1301		June 18, 1890	As owner.....	Washington.			
1405		July 14, 1890	As owner.....	La Porte City.			
1431		June 24, 1890	As owner.....	Leona.			
1450		July 17, 1890	As owner.....	Wilton Junction.			
1490		July 8, 1890	As owner.....	Bussey.	Oskaloosa.....	Mar. 28, 1897	
1491		June 14, 1890	As owner.....	Oreoso.			
1509		Aug. 27, 1890	As owner.....	Davenport.	Princeton.....	June 17, 1894	
1670		Sept. 17, 1890	By examination.....	Pomeroy.	Laurens.....	July 5, 1893	
1688	J.	Aug. 25, 1890	By examination.....	Fort Dodge.			
1708		Oct. 14, 1890	By examination.....	Davenport.	Emmetsburg.....	Sept. 12, 1899	
1881		Aug. 30, 1890	By examination.....	Marion.	Des Moines.....	April 29, 1896	Out of business.
1890		Aug. 30, 1890	By examination.....	Mount Etas.			
2126		May 27, 1891	By examination.....	Morning Sun.			
2129		May 20, 1891	By examination.....	Union.			
2125		May 24, 1891	By examination.....	Geokuk.			
2173		July 31, 1891	By examination.....	Afton.	Shannon City.....	June 10, 1899	
2194		Aug. 10, 1891	By examination.....	Marchester.			
2204		Aug. 28, 1891	By examination.....	Lewis.	Grant.....	Dec. 5, 1893	
2269		Sept. 1, 1891	By examination.....	Ottumwa.	Des Moines.....	Nov. 29, 1896	
2274		Nov. 4, 1891	By examination.....	Storm Lake.	Alta.....	Dec. 7, 1893	In Illinois.
2285		Feb. 25, 1892	By examination.....	Nugent's Grove.			
2281		April 27, 1892	By examination.....	Monteruma.			
2331		April 7, 1892	By examination.....	Hampton.			
2446		June 4, 1892	By examination.....	Franklinville.	Oskaloosa.....	May 12, 1896	In colonies.
2449		Jan. 8, 1893	By examination.....	Bloomfield.			
2466		Jan. 10, 1893	By examination.....	Avoca.			
2495		April 24, 1893	By examination.....	Cocoon.			
2523		Sept. 12, 1893	By examination.....	Le Mars.	Larchwood.....	Nov. 4, 1893	In Benwick. In Polo, Ill.

2921	Oct. 22, 1883	.....	Lake City.	.....	.....	In Illinois.
2716	Feb. 1, 1884	.....	Wall Lake	.....	.....	.....
2740	April 15, 1884	.....	Council Bluffs.	.....	.....	.....
2718	Aug. 5, 1884	.....	Collins.	.....	.....	.....
2811	Nov. 21, 1884	.....	Magnolia	.....	(Magnolia only).	Out of business.
2713	April 21, 1885	.....	Magnolia	.....	.....	.....
2717	Dec. 1, 1885	.....	Oreoc.	.....	.....	Out of business.
2742	Feb. 15, 1886	.....	West Liberty.	.....	.....	.....
2716	Feb. 15, 1886	.....	Greene.	.....	.....	.....
2740	Mar. 15, 1886	.....	Cherokee.	.....	Stout City.	July 30, 1888
2703	May 15, 1886	.....	Williams.	.....	Dayton.	July 9, 1888
2703	May 15, 1886	.....	Lehrville.	.....	.....	.....
2711	Sept. 7, 1886	.....	.....	.....	West Bend.	Mar. 28, 1889
2701	Oct. 7, 1886	.....	.....	.....	Muscadine.	Jan. 6, 1889
2703	Oct. 7, 1886	.....	.....	.....	Armstrong.	Dec. 1, 1889
2703	Nov. 7, 1887	.....	.....	.....	.....	Out of business.
2713	Jan. 14, 1887	.....	.....	.....	.....	.....
2726	Feb. 14, 1887	.....	.....	.....	.....	.....
2703	Oct. 15, 1887	.....	.....	.....	Villies.	April 15, 1887
2703	Feb. 27, 1888	.....	.....	.....	.....	.....
2703	Feb. 27, 1888	.....	.....	.....	Ashton.	Jan. 25, 1890
2703	Feb. 27, 1888	.....	.....	.....	.....	.....
2703	April 1, 1888	.....	.....	.....	Clinton.	April 15, 1889
2703	Aug. 20, 1888	.....	.....	.....	.....	.....
2715	Sept. 15, 1888	.....	.....	.....	.....	.....
2723	Oct. 15, 1888	.....	.....	.....	.....	.....
2747	Oct. 20, 1888	.....	.....	.....	Des Moines.	Aug. 24, 1888
2703	Feb. 19, 1889	.....	.....	.....	.....	.....
2713	Mar. 15, 1889	.....	.....	.....	Burlington.	Mar. 2, 1893
2703	Mar. 15, 1889	.....	.....	.....	.....	.....
2703	April 9, 1889	.....	.....	.....	Ocheyedan.	Aug. 20, 1897
2703	April 22, 1889	.....	.....	.....	Stout City.	Sept. 15, 1895
2703	May 7, 1889	.....	.....	.....	.....	.....
2703	May 21, 1889	.....	.....	.....	.....	.....
2703	June 15, 1889	.....	.....	.....	Des Moines.	Mar. 25, 1893
2703	Aug. 20, 1889	.....	.....	.....	Jewell Junction.	July 17, 1895
2703	Sept. 5, 1889	.....	.....	.....	.....	.....
2703	Sept. 17, 1889	.....	.....	.....	Machakineok.	Nov. 4, 1893
2703	Nov. 6, 1889	.....	.....	.....	.....	.....
2703	Dec. 15, 1889	.....	.....	.....	.....	.....
2703	Dec. 15, 1889	.....	.....	.....	Center Point.	July 2, 1895
2703	Dec. 15, 1889	.....	.....	.....	.....	.....
2703	Jan. 7, 1890	.....	.....	.....	Akron.	Dec. 7, 1897
2703	Jan. 20, 1890	.....	.....	.....	Oedar Rapids.	.....
2703	Feb. 4, 1890	.....	.....	.....	Bloomfield.	June 17, 1890
2703	Mar. 1, 1890	.....	.....	.....	.....	.....
2703	Mar. 1, 1890	.....	.....	.....	Martinsburg.	Aug. 12, 1898
2703	April 15, 1890	.....	.....	.....	.....	.....

ABSTRACT—CONTINUED.

Number of Certificates.	NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LASTEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
3919	Obadwick, J. B.	Aug. 8, 1890	By examination.	Self.	Hempers.	Nov. 12, 1897	
3974	Cochran, W. L.	Jan. 15, 1891		Burlington.	Jewell Junction.	Sept. 20, 1894	
3984		Feb. 8, 1891		Winchester.	Ft Dodge.	Feb. 5, 1899	
3987		Feb. 8, 1891		Winchester.	Centerville.	Aug. 7, 1891	
4030	J. L.	April 24, 1891		Des Moines.	Woden.	Feb. 15, 1899	
4038		May 1, 1891		Des Moines.			
4043	M. A.	June 7, 1891		Sioux City.			
4051		June 7, 1891		Salem.			
4073		Aug. 2, 1891		Thayer.	Afton.	Jan. 14, 1898	Out of business. Left the state.
4096		Aug. 11, 1891		Olermont.			
4155		Dec. 6, 1891		Iowa Falls.			
4169		Feb. 1, 1892		Marengo.			
4176		Feb. 1, 1892		Knorrville.	Mechanicsville.	Feb. 23, 1899	
4185	O.	Feb. 22, 1892		Ashton.	Lehrville.	May 5, 1899	
4186		Feb. 24, 1892		Galeburg.	Des Moines.	April 7, 1894	
4192	B.	Mar. 1, 1892		Burlington.	Albia.	Mar. 24, 1893	
4200		Mar. 7, 1892		R-d Oak.	Wabington.	May 5, 1899	
4201		Mar. 12, 1892		Des Moines.		May 5, 1899	
4209		Mar. 12, 1892		Mason City.		May 5, 1899	
4210	M.	April 5, 1892		Prairie City.		May 5, 1899	
4250		May 5, 1892		Ottumwa.		May 5, 1899	
4252		June 7, 1892		West Bend.	Kellerton.	Sept. 26, 1896	
4253		June 7, 1892		Anita.			
4254		June 24, 1892		Greenfield.			
4271		July 12, 1892		Collins.	Colo.	Oct. 5, 1895	
4275		July 20, 1892		Lehigh.	Odebolt.	July 26, 1899	
4288		Sept. 12, 1892		Benwick.			
4289		Nov. 1, 1892		Conrad.			
4292	Garris, E. U.	Nov. 1, 1892		Ohurdan.	Gilmore City.	April 24, 1895	
4351	Converse, L. E.	Dec. 27, 1892		Des Moines.	Packwood.	April 16, 1897	
4361	Campbell, L. B.	Dec. 15, 1892		Fort Dodge.	Washington.	Feb. 12, 1898	
4362	Coad, James A.	Jan. 10, 1893		Davenport.	Waverly.	Feb. 9, 1898	
4363	Umaraw, George E.	Jan. 17, 1893		Hull.			
4369	Craig, W. L.	Feb. 8, 1893		Montezuma.	Mac Olay.	June 2, 1898	
4380	Cowles, V. D.	Feb. 8, 1893		Lone Tree.	Oushing.	May 14, 1894	

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5597	Christensen, John	Nov.	1, 1899	Graduate.	Ft. Dodge.	Clarion	June 28, 1899	
5598	Quay, John J.	Jan.	2, 1899	By examination.	Melrose.			
5599		Feb.	3, 1899	Graduate.	Muscatine.			
5600		Mar.	7, 1899	Graduate.	Brooklyn.			
5601		Mar.	7, 1899	Graduate.	Council Bluffs.			
5602		Apr.	4, 1899	By examination.	Underwood.			
5603		Apr.	4, 1899	By examination.	Hartston.			
5604		Apr.	4, 1899	By examination.	Waterloo.	Larchwood	May 17, 1899	
5605		May 17, 1899	Graduate.	Waterloo.				
5606		May 17, 1899	Graduate.	Waterloo.				
5607		July 18, 1899	By examination.	Des Moines.				
5608		Aug.	1, 1899	Graduate.	Riverside.			
5609		Aug.	1, 1899	Graduate.	Esterville.			
5610		Aug.	1, 1899	Graduate.	Bayard.			
5611		Aug.	1, 1899	Graduate.	Des Moines.			
5612		June 21, 1899	By examination.	Charter Oak.				
5613		June 21, 1899	As owner.	Stiles.				
5614		June 21, 1899	As owner.	Bellevue.				
5615		June 21, 1899	As owner.	Le Mar.				
5616		June 21, 1899	As owner.	Center Point.				
5617		June 21, 1899	As owner.	Lewis.				
5618		June 21, 1899	As assistant.	Muscatine.				
5619		June 17, 1899	As owner.	Mineral Ridge.				
5620		June 14, 1899	As owner.	Monona.				
5621		July 1, 1899	As owner.	Derby.				
5622		July 1, 1899	As owner.	Algona.				
5623		July 1, 1899	As owner.	Algona.				
5624		July 1, 1899	As owner.	Algona.				
5625		June 28, 1899	As principal.	Centerville.				
5626		June 19, 1899	As owner.	Oxford.				
5627		June 17, 1899	As owner.	Postville.				
5628		July 23, 1899	As owner.	Monroe.				
5629		July 21, 1899	As owner.	Muscatine.				
5630		Aug. 7, 1899	As owner.	Dumont.				
5631		Aug. 24, 1899	As owner.	Council Bluffs.				
5632		Aug. 24, 1899	As owner.	Marshalltown.				
5633		Aug. 24, 1899	As owner.	De Kalb.				
5634		Sept. 23, 1899	By examination.	Lucas.				
5635		Sept. 23, 1899	By examination.	Guthrie Center.				
5636		Nov. 1, 1899	By examination.	Nasau.				
5637		Dec. 27, 1899	By examination.	Newell.				
5638		Jan. 27, 1899	By examination.	Lucas.				
5639		May 10, 1899	By examination.	Peterson.				
5640		May 10, 1899	By examination.	Columbus Junction.				
5641		Jan. 9, 1899	By examination.	Ferguson.				
5642		Mar. 4, 1899	By examination.	Oshtemo.				
5643		Apr. 21, 1899	By examination.	Dyers.				
5644		June 4, 1899	By examination.	Davenport.				
5645		July 2, 1899	By examination.	Orange City.				
5646		Sept. 4, 1899	By examination.	Boone.				
5647		Jan. 2, 1899	By examination.	Dunlap.				
5648		Feb. 17, 1899	By examination.	Marshalltown.				
5649		May 19, 1899	By examination.	Marshalltown.				
5650		May 19, 1899	By examination.	Marshalltown.				
5651		May 19, 1899	By examination.	Marshalltown.				
5652		May 19, 1899	By examination.	Marshalltown.				
5653		May 19, 1899	By examination.	Marshalltown.				
5654		May 19, 1899	By examination.	Marshalltown.				
5655		May 19, 1899	By examination.	Marshalltown.				
5656		May 19, 1899	By examination.	Marshalltown.				
5657		May 19, 1899	By examination.	Marshalltown.				
5658		May 19, 1899	By examination.	Marshalltown.				
5659		May 19, 1899	By examination.	Marshalltown.				
5660		May 19, 1899	By examination.	Marshalltown.				
5661		May 19, 1899	By examination.	Marshalltown.				
5662		May 19, 1899	By examination.	Marshalltown.				
5663		May 19, 1899	By examination.	Marshalltown.				
5664		May 19, 1899	By examination.	Marshalltown.				
5665		May 19, 1899	By examination.	Marshalltown.				
5666		May 19, 1899	By examination.	Marshalltown.				
5667		May 19, 1899	By examination.	Marshalltown.				
5668		May 19, 1899	By examination.	Marshalltown.				
5669		May 19, 1899	By examination.	Marshalltown.				
5670		May 19, 1899	By examination.	Marshalltown.				
5671		May 19, 1899	By examination.	Marshalltown.				

Out of business.

In Nebraska.

In Sabetha, Kas.

Number of certificate.	NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
3025	De Marcha, F. E.	June 15, 1890	By examination.	Redcliffe.	Bellevue.	Jan. 10, 1894	
3026	Deaullin, John C.	June 15, 1890	By	Maquoketa.	Mapleton.	Feb. 2, 1897	
3027	Dyer, Henry W.	July 20, 1887	By	Pomroy.	Humboldt.		
3028	Dyer, H. C. W.	Mar. 15, 1887	By	Urbana.	Urbana.		
3029	Dugman, C. W., Jr.	Aug. 15, 1887	By	Salmon.	Pringhar.	May 5, 1890	In Pierce, Neb.
3030	Dunham, W. B.	Sept. 20, 1887	By	St. Anthony.			
3031	Dunham, Fred W.	Sept. 27, 1887	By	Albion.	Tripoli.		In California.
3032		Nov. 29, 1887	By examination.	Des Moines.			
3033		Nov. 29, 1887	By examination.	Frederica.			
3034		Feb. 24, 1888	By	Lucas.	Brighton.	June 4, 1890	
3035		May 15, 1888	By	Lucas.			
3036		May 20, 1888	By	Geddes Rapids.			
3037		Dec. 20, 1888	By	Mason City.	Redfield.	June 13, 1890	In Illinois.
3038		Jan. 29, 1889	By	Adel.			
3039		Jan. 5, 1889	By	Danison.			
3040		Feb. 8, 1889	By	Dubuque.			
3041		April 9, 1889	By	Moville.			
3042		April 16, 1889	By	Toledo.	Charles City.	Mar. 2, 1893	
3043		Aug. 10, 1889	By	Gilman.			
3044		Aug. 14, 1889	By	Logan.	Hamburg.		
3045		Dec. 16, 1889	By	Dunlap.	Rockwell City.	June 10, 1893	
3046		Dec. 20, 1889	By	Mapleton.	Des Moines.	Feb. 24, 1891	
3047		Dec. 20, 1889	By	Greco.	Waucoma.	April 8, 1897	
3048		Feb. 4, 1890	By	Bayard.			
3049		Mar. 4, 1890	By	Moulton.	Seymour.	Dec. 4, 1895	
3050		Mar. 18, 1890	By	Union.	Story City.	Sept. 15, 1895	
3051		June 4, 1890	By	Bonaparte.			
3052		June 18, 1890	By	Rock Valley.	Lime Springs.	Dec. 20, 1895	
3053		Nov. 4, 1890	By	George.			
3054		Nov. 11, 1890	By	Des Moines.	Adel.	Nov. 20, 1891	
3055		Feb. 13, 1891	By	Shenandoah.	Greenfield.	Mar. 12, 1899	
3056		Feb. 24, 1891	By	Council Bluffs.			
3057		Mar. 7, 1891	By	Ogden.	Baxter.		
3058		Mar. 7, 1891	By	Ogden.	Colesburg.	July 8, 1891	
3059		June 7, 1891	By	Garroll.		July 8, 1891	Out of business.
3060		June 10, 1891	By	Redford.		— 1894	
3061		Nov. 17, 1891	By examination.	Perry.	Newton.	— 1895	
3062		Nov. 17, 1891	By examination.	Davenport.		April 25, 1896	

4254	Dorr, O. H.	May 2, 1898	By examination.	Stout City	Wellburg	Nov. 6, 1898
4255	Diebner, W. F.	July 1, 1898	By examination.	Clinton	Wellburg	Mar. 15, 1899
4256	Dobson, Mrs. M. H.	July 1, 1898	By examination.	Le Grand		
4276	Dorgan, John J.	July 24, 1898	By examination.	Davenport	Fremont	June 1, 1899
4287		Jan. 3, 1899	By examination.	Waterloo	Rondant	Dec. 20, 1899
4287		Mar. 16, 1899	By examination.	Des Moines	Myrtle	Dec. 20, 1899
4287		Feb. 18, 1899	By examination.	Centerville		
4287		July 1, 1899	By examination.	Colfax		
4463		Aug. 1, 1899	By examination.	Davenport		
4465		Oct. 2, 1899	By examination.	Ft. Dodge		
4465		Dec. 10, 1899	By examination.	Mt. Pleasant		
4466		Feb. 6, 1900	By examination.	Charles City		
4466		Feb. 6, 1900	By examination.	Woodbine		
4467		Feb. 27, 1900	By examination.	Des Moines	Gowrie	Dec. 20, 1900
4468		Apr. 17, 1900	By examination.	Des Moines	Rockwell	Jan. 27, 1900
4468		May 1, 1900	By examination.	Des Moines		
4468		May 1, 1900	By examination.	Wyoming	Burlington	July 6, 1900
4468		June 1, 1900	By examination.	Mediapolis		
4678		Sept. 6, 1900	By examination.	Mason City		
4730		Nov. 6, 1900	By examination.	Lohrville	Shenandoah	Jan. 6, 1901
4766		Nov. 7, 1900	By examination.	Des Moines		
4766		Jan. 1, 1901	By examination.	Spirit Lake		
4766		Jan. 1, 1901	By examination.	Evan		
4766		Jan. 1, 1901	By examination.	Manchester		
4822		Feb. 15, 1901	By examination.	Afton	Masonville	Aug. 6, 1907
4822		Mar. 6, 1901	By examination.	Sibley	Busey	Mar. 8, 1900
4877		May 7, 1901	By examination.	Decorah	Elma	Sept. 4, 1900
4899		July 2, 1901	By examination.	Princeton		
4904		Sept. 10, 1901	By examination.	Donnellson	Earlville	Dec. 2, 1902
4945		Nov. 7, 1901	By examination.	Rolle	New Sharon	Dec. 19, 1902
4945		Jan. 7, 1902	By examination.	Colo.	Plover	Dec. 8, 1902
4945		Mar. 2, 1902	By examination.	Perry	Monmouth	
5013		Mar. 7, 1902	By examination.	Jerome		
5031		Mar. 7, 1902	By examination.	Des Moines		
5036		Mar. 7, 1902	By examination.	Malcom		
5065		May 16, 1902	Graduate	Northwood		
5101		Aug. 4, 1902	By examination.	Madrid		
5126		Aug. 4, 1902	By examination.	Oaage		
5173		Dec. 1, 1902	By examination.	Ramsen	Livermore	Jan. 7, 1904
5253		June 20, 1903	Graduate	Dow City	Clinton	Jan. 11, 1904
5259		July 6, 1903	By examination.	Andrew		
5278		Dec. 7, 1903	By examination.	Stout City		
5278		Dec. 7, 1903	By examination.	Fremont		
5318		Jan. 4, 1904	By examination.	Anamosa		
5367		Feb. 1, 1904	By examination.	Fairbank		
5470		Apr. 1, 1904	By examination.	Marysville		
5496		May 2, 1904	By examination.	Lime Springs		
5536		Aug. 2, 1904	By examination.	Des Moines	Diaburg	Aug. 24, 1906
5556		Oct. 4, 1904	By examination.	Bellevue		
5612		Dec. 6, 1904	By examination.	Bedford		
5646		Mar. 7, 1905	By examination.	Rockwell		

In Texas

Kansas City, Mo.

Nebraska.

ABSTRACT—CONTINUED.

NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
Thomson Maurice J	April 4, 1899	Graduate	Oakland.			
5603	April 4, 1899	Graduate	Charlton.			
5604	April 24, 1899	Graduate	Des Moines.	Glidden.	June 1, 1899	
5676	May 17, 1899	Graduate	Iowa City.			
5694	May 2, 1899	By examination.	Lewis.			
5698	July 6, 1899	Assistant	Missouri Valley.			
5720	Aug. 1, 1899	Graduate	Carson.			
5737	June 18, 1899	As owner.				
830	June 17, 1899	As owner.				
443	June 8, 1899	As owner.				
500	June 8, 1899	As owner.				
505	June 8, 1899	As owner.				
687	June 8, 1899	As assistant.				
944	June 7, 1899	As owner.		Kenseth.	Mar. 6, 1899	
1004	June 10, 1899	As owner.				
1089	June 18, 1899	As owner.				
1324	June 2, 1899	As owner.				
1415	June 18, 1899	As principal.				
1493	July 18, 1899	As owner.				
1645	Aug. 24, 1899	As owner.				
1710	Aug. 24, 1899	As owner.				
1781	July 31, 1899	By examination.		Des Moines.	Sept. 25, 1899	
1813	Sept. 25, 1899	As owner.				
2123	Oct. 20, 1899	As owner.		Arion.	Dec. 12, 1899	
2340	April 30, 1899	By				Out of business.
2340	Feb. 17, 1899	By				
2340	June 5, 1899	By				
2343	Aug. 30, 1899	By		Hedrick	May 12, 1899	
2343	June 5, 1899	By		Hawarden		Out of business.
2343	Aug. 4, 1899	By		Gilmore City.		Out of business.
2343	Mar. 2, 1899	By			Mar. 20, 1899	
2344	June 1, 1899	By				
2344	April 6, 1899	By		Valley Junction	Feb. 16, 1899	
2344	May 17, 1899	By examination.		Northwood	Sept. 14, 1899	In Missouri.
2344	July 24, 1899	By examination.		Red Oak	Aug. 18, 1899	
2345	Nov. 14, 1899	By examination.				
2345	April 2, 1899	By examination.		Stratford	April 20, 1899	
2345	Nov. 20, 1899	By examination.		Lamont	May 15, 1899	
2345	May 31, 1899	By examination.		Carroll		
2345		By examination.		Strawberry Point		

Number of certificates.

	By examination.	A roots.	In Nebraska.
July 10, 1899	By examination.	Ogden.....	Dec. 75, 1898
Oct. 1, 1899	By examination.	Malyra.....	Nov. 24, 1898
Oct. 15, 1899	By examination.	Iowa City.....	Mar. 15, 1899
Jan. 5, 1900		Gladbrook.....	Dec. 24, 1894
Aug. 26, 1899		Onawa.....	
Mar. 25, 1901		Marshalltown.....	
June 2, 1901		Tingley.....	
Sept. 1, 1901		Marshalltown.....	
Dec. 21, 1901		Webster.....	
Mar. 1, 1902		Pilot Mound.....	
May 1, 1902		Easer.....	
April 14, 1902		Eldora.....	
Jan. 2, 1903		Moulton.....	
Jan. 24, 1903		Kearney.....	
July 12, 1903		Keosauqua.....	
Nov. 2, 1903		Boone.....	
Apr. 10, 1904		Clinton.....	
April 20, 1904		Oedar Rapids.....	
June 22, 1904		Oamarbridge.....	
Sept. 10, 1904		Eagle Grove.....	
Dec. 4, 1904		Tingley.....	
Feb. 5, 1905		Des Moines.....	
May 14, 1905		Quincy.....	
Dec. 17, 1905		Newell.....	
Mar. 2, 1906		Ransom.....	
Apr. 21, 1906		Des Moines.....	
July 1, 1906		Iowa City.....	
Aug. 2, 1906		Dana.....	
May 27, 1907		Vandace.....	
Aug. 5, 1907		Adrian.....	
Oct. 5, 1907		Kennett.....	
Mar. 1, 1908		Roades.....	
Apr. 5, 1908		Sacramento Bluffs.....	
April 5, 1908		Clearfield.....	
April 5, 1908		Monroe.....	
Aug. 1, 1909		Glenwood.....	
Aug. 1, 1909		West Liberty.....	
June 12, 1909		Keokuk.....	
June 24, 1909		Redfield.....	
June 29, 1909		Mineola.....	
June 2, 1909		Dubuque.....	
June 4, 1909		Elgin.....	
June 9, 1909		Harian.....	
June 9, 1909		Jefferson.....	
June 21, 1909		Akron.....	
July 1, 1909		Pella.....	
June 4, 1909		Shelby.....	
July 22, 1909		Waterloo.....	
July 27, 1909		Jefferson.....	
July 27, 1909		Glenwood.....	
As assistant.			
By examination.			
July 27, 1909		Williamsburg.....	July 9, 1905

ABSTRACT—CONTINUED.

Number of certificate.	NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LASTEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
1781	Fox, Jacob G.	Aug. 6, 1880	As owner.	Avoca.	Boone.	Aug. 2, 1887	
1782		Aug. 10, 1880	By examination.	Glidden.	Harlan.	Oct. 13, 1887	
1783		Oct. 13, 1880	By examination.	Oxford.	Rhodes.	Sept. 19, 1888	Out of business.
1784		Sept. 23, 1880	By examination.	Glidden.	Williams.	April 23, 1889	Out of business.
1785		Oct. 23, 1880	By examination.	Glidden.	Clarton.	Sept. 6, 1897	Out of business.
1786		Nov. 23, 1880	By examination.	Glidden.	Iowa City.	Oct. 4, 1893	Out of business.
1787		Nov. 23, 1880	By examination.	Glidden.	Manion.	Jan. 20, 1899	Out of business.
1788		Nov. 23, 1880	By examination.	Glidden.	Jerome.	Aug. 17, 1903	Out of business.
1789		Nov. 23, 1880	By examination.	Glidden.	Rock Rapids.	Mar. 25, 1902	Out of business.
1790		Nov. 23, 1880	By examination.	Glidden.			Out of business.
1791		Nov. 23, 1880	By examination.	Glidden.	Prairie City.	July 5, 1887	Out of business.
1792		Nov. 23, 1880	By examination.	Glidden.			In Wisconsin.
1793		Nov. 23, 1880	By examination.	Glidden.	Scranton.	May 2, 1891	
1794		Nov. 23, 1880	By examination.	Glidden.	Clearfield.	June 11, 1899	
1795		Nov. 23, 1880	By examination.	Glidden.	North English.	July 21, 1899	
1796		Nov. 23, 1880	By examination.	Glidden.	Farmington.	Dec. 24, 1894	
1797		Nov. 23, 1880	By examination.	Glidden.	Medford.	Sept. 2, 1899	In Nebraska.
1798		Nov. 23, 1880	By examination.	Glidden.	Massena.	June 2, 1899	

2890	April 18, 1890	By examination.	Viele	Rockford.	.....	Out of business.
2891	Sept. 19, 1890	By examination.	Clarksville.	Pauline.	Oct. 23, 1895	In Wisconsin.
2892	April 20, 1891	By examination.	Nevada	Redfield.	April 5, 1897	.....
4045	May 6, 1891	By examination.	What Cheer.	.....	.....	.....
4053	May 8, 1891	By examination.	Wilton Junction.	Thompson.	Mar. 6, 1893	Out of business.
4107	Aug. 13, 1891	Graduate	Decorah.	Lynaville.	Nov. 13, 1893	.....
4373	July 14, 1891	By examination.	Collins	Monona.	Nov. 21, 1893	.....
4398	Aug. 2, 1893	By examination.	McGregor	.....	.....	.....
4314	Aug. 4, 1893	By examination.	Bloomfield.	.....	.....	.....
4325	Oct. 1, 1893	By examination.	Silverdale.	Jolley.	July 7, 1899	Out of business.
4408	Dec. 27, 1893	By examination.	Newton.	Jolley.	Mar. 6, 1899	.....
4453	Feb. 28, 1893	By examination.	Des Moines.	.....	.....	.....
4452	May 29, 1893	By examination.	Mystic.	Titonka.	Mar. 6, 1899	In Wisconsin.
4503	Aug. 9, 1893	By examination.	Marcus	.....	.....	.....
4509	Aug. 9, 1893	By examination.	Dubuque.	Stout City.	Nov. 10, 1897	Out of business.
4544	Sept. 14, 1893	By examination.	Olin.	Pocahontas.	Feb. 17, 1899	.....
4715	Nov. 6, 1894	By examination.	Fort Dodge.	.....	.....	.....
4727	Feb. 6, 1894	By examination.	Onawa	Stout City.	Nov. 10, 1897	.....
4806	Sept. 4, 1894	By examination.	Gilmore City.	.....	.....	.....
4808	Sept. 4, 1894	By examination.	Newton.	Clear Lake.	Mar. 21, 1898	.....
4810	Jan. 23, 1895	By examination.	Des Moines.	Perry.	May 4, 1898	.....
4898	Feb. 6, 1895	By examination.	Charles City.	.....	Jan. 1, 1898	.....
5027	Feb. 7, 1893	By examination.	Des Moines.	.....	.....	.....
5064	Mar. 28, 1896	Graduate	Des Moines.	Cedar Rapids.	Dec. 24, 1891	.....
5063	April 7, 1896	By examination.	Toledo	Oxford.	Sept. 23, 1893	.....
5063	April 7, 1896	By examination.	Marion	Stout City.	Dec. 13, 1893	.....
5068	April 21, 1896	By examination.	Hamburg.	Rowan.	April 8, 1893	.....
5090	June 2, 1896	By examination.	Pringhar.	Beaman.	April 21, 1896	.....
5143	Sept. 1, 1896	By examination.	Reinbeck.	Plainfield.	Aug. 28, 1897	.....
5158	Jan. 6, 1897	By examination.	Anita.	Galt.	Mar. 8, 1898	.....
5153	Jan. 6, 1897	By examination.	Reinbeck.	.....	.....	.....
5305	Jan. 6, 1897	By examination.	Des Moines.	.....	.....	.....
5315	Feb. 2, 1897	By examination.	Des Moines.	.....	.....	.....
5328	Mar. 2, 1897	By examination.	Wagon.	.....	.....	.....
5329	Mar. 2, 1897	By examination.	Oakland.	.....	.....	.....
5345	Mar. 2, 1897	By examination.	Newell.	.....	.....	.....
5352	Mar. 2, 1897	By examination.	Sumner.	.....	.....	.....
5356	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5357	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5358	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5359	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5360	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5361	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5362	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5363	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5364	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5365	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5366	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5367	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5368	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5369	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5370	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5371	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5372	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5373	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5374	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5375	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5376	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5377	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5378	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5379	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5380	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5381	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5382	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5383	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5384	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5385	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....
5386	Mar. 2, 1897	By examination.	Sioux Falls.	.....	.....	.....

ABSTRACT—CONTINUED.

Number of Certificate	NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
5690	Falkenhainer, Chas.....	May 17, 1899	Graduate.....	Guttenburg	Dubuque.....	May 25, 1899	
5706	June 5, 1899	Graduate.....	Andubon.....	.....	.....
5723	July 6, 1899	Graduate.....	Marwell.....	Webster City... ..	Aug. 2, 1899	
5735	July 6, 1899	Graduate.....	Des Moines.....	.....	.....
5746	July 18, 1899	Graduate.....	What Cheer.....	.....	.....
5750	E.....	July 18, 1899	.....	Osage.....	.....	.....
5760	Aug. 1, 1899	.....	Waterloo.....	.....	.....
5781	Aug. 1, 1899	By examination..	Council Bluffs..	.....	.....
186	June 14, 1899	As owner.....	What Cheer.....	.....	.....
301	June 5, 1899	As owner.....	Bloomfield.....	.....	.....
611	B.....	June 2, 1899	As owner.....	Grinnell.....	.....	.....
819	June 10, 1899	As owner.....	Oscola.....	.....	.....
867	June 10, 1899	As owner.....	Muscataine.....	.....	.....
888	June 18, 1899	As owner.....	Mapleton.....	.....	.....
988	June 18, 1899	As owner.....	Crummwa.....	.....	.....
1265	June 2, 1899	As assistant..	Sabula.....	.....	.....
1295	July 2, 1899	As owner.....	Union.....	Harris.....	April 1, 1907	
1293	June 2, 1899	As assistant..	Washington.....	.....	.....
1290	D.....	June 12, 1899	As owner.....	Wheatland.....	.....	.....
1452	July 17, 1899	Graduate.....	Story City.....	.....	.....
1505	July 27, 1899	As owner.....	Waukon.....	.....	.....
1714	July 31, 1899	As owner.....	Stuart.....	Des Moines... ..	Mar. 15, 1898	
1728	June 13, 1899	As owner.....	McChesneyville.	.....	.....
1864	Sept. 13, 1899	By.....	Bedford.....	.....	.....	In Wisconsin.
1925	Nov. 25, 1899	By.....	Iowa Falls.....	.....	.....
2012	E.....	Jan. 27, 1891	By.....	Logan.....	.....	.....
2114	Sept. 29, 1891	By.....	Sac City.....	Duncombe.....	April 23, 1898	
2200	Aug. 29, 1891	By.....	Greenfield.....	Ellsworth.....	Mar. 2, 1893	
2291	Feb. 28, 1893	By.....	Denison.....	Buzaio Center... ..	May 2, 1894	
2455	May 24, 1893	By.....	Oskaloosa.....	Mailla.....	Dec. 24, 1896	Out of business.
2459	Aug. 21, 1893	By.....	Avoca.....	.....	.....
2519	Sept. 18, 1893	By examination..	Milton.....	Webster City.....	April 4, 1894	In Missouri.
2523	Mar. 4, 1894	By examination..	Williams.....	.....	.....
2714	July 19, 1894	By examination..	Barter.....	.....	.....
2849	Oct. 23, 1894	By examination..	Tripoli.....	.....	.....
3007	Nov. 24, 1895	By examination..	Pilot Mound.....	.....	.....
3104	Cope, Irwin.....	.....	.....	.....	.....	.....

Commissioner's Name	Commissioner's Address	Commissioner's Office	Commissioner's Term
Harlan	Atlantic	Sept. 2, 1899	
Carson	Lowa City	Jan. 20, 1899	
Ogden	Oxford Junction	Oct. 14, 1897	
Osage	Winterset	Mar. 17, 1898	
Marcus	Trar.	Oct. 22, 1898	
New Hampton	Monteruma	Feb. 9, 1898	
Sioux City	Jewell Junction	April 17, 1899	
Orange City	West Branch	Sept. 7, 1899	
Waukon	Ottumwa	Mar. 21, 1898	
Cedar Falls	Des Moines	Jan. 30, 1899	
Marengo	Perry	Oct. 19, 1891	
Webster City	Waukon	May 28, 1898	
Washington	Des Moines	Feb. 18, 1899	
Muscatine	Rockford	Mar. 18, 1898	
Malvern	Ottumwa	Mar. 25, 1898	
Strawberry Point	Manchester	Mar. 20, 1899	
Springdale	Chaplin	June 22, 1894	
Iowa City	Garden Grove	Jan. 1, 1897	
Janesville	Lorimer	Dec. 8, 1898	
Eldon	Ogden	Nov. 8, 1897	
Doon	Shellsburg	May 17, 1899	
Carson	Akron	Nov. 6, 1894	
Lohrville	Palsaki	Mar. 20, 1899	
Des Moines	Springville	Oct. 24, 1898	
Trar			
Bode			
Bloomfield			
Muscatine			
Hull			
Shenandoah			
Des Moines			
Lowa City			
Mechanicsville			
Osage			
Sioux City			
Sheldon			
Fort Dodge			
Dubuque			
Tripoli			
Mapleton			
Wiscota			
Troy			
Cherokee			

Out of business.

In Nebraska.

Commissioner's Name

Commissioner's Name	Commissioner's Address	Commissioner's Office	Commissioner's Term
Jan. 4, 1897			
Feb. 20, 1897			
April 10, 1897			
May 20, 1897			
Sept. 8, 1897			
Sept. 7, 1898			
May 15, 1898			
June 5, 1898			
June 19, 1898			
Aug. 21, 1898			
Mar. 19, 1899			
Mar. 19, 1899			
May 21, 1899			
July 24, 1899			
Aug. 20, 1899			
Oct. 25, 1899			
Feb. 8, 1899			
June 19, 1899			
Sept. 2, 1899			
Oct. 21, 1899			
Mar. 2, 1899			
Mar. 17, 1899			
June 2, 1899			
Sept. 1, 1899			
Oct. 8, 1899			
Oct. 12, 1899			
Jan. 5, 1899			
Feb. 2, 1899			
April 24, 1899			
Mar. 22, 1899			
July 12, 1899			
Aug. 4, 1899			
Sept. 6, 1899			
Oct. 4, 1899			
Feb. 7, 1899			
Mar. 4, 1899			
May 12, 1899			
May 2, 1899			
May 5, 1899			
June 20, 1899			
June 20, 1899			
July 5, 1899			
Mar. 8, 1899			
Mar. 24, 1899			
April 2, 1899			
May 1, 1899			

ABSTRACT—CONTINUED.

NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
Gill, Vincent F.	June 5, 1894	By examination.	Fairbank	McLeire.	Feb. 25, 1896	
Graves, Alva V.	Aug. 1, 1894	By examination.	Hawarden.	Iowa Falls.	May 12, 1896	
Gregory, F. W.	Aug. 6, 1894	By examination.	Geneva.			
Gipple, L. U.	Oct. 1, 1894	By examination.	Leite.			
Guernsey, J. J.	May 1, 1894	By examination.	Bloomfield.			
	Nov. 12, 1894	By examination.	Marshalltown.			
	Jan. 12, 1895	By examination.	Madrid.	Osage	Feb. 22, 1897	
E.	Mar. 6, 1895	By examination.	Anamosa.	Byan.	Mar. 7, 1896	
	April 7, 1895	By examination.	Manchester.	Garner.	April 24, 1896	
re G.	May 1, 1895	By examination.	Laverne.			
	Sept. 11, 1895	By examination.	Early.			
	Oct. 6, 1895	By examination.	Clarian.			
	Jan. 6, 1896	By examination.	Gladbrook.			
	Jan. 1, 1896	By examination.	Laecade			
	Feb. 1, 1896	By examination.	Harchwood.			
	April 7, 1896	By examination.	Hawarden.			
	April 17, 1896	By examination.	Madison.	Manchester	July 14, 1896	
	April 17, 1896	By examination.	Fredericksburg.	Plainfield.	May 6, 1896	
	May 1, 1896	By examination.	Waterloo.			
	May 1, 1896	By examination.	Ocheyedan.			
	June 1, 1896	By examination.	Goodell.			
	June 1, 1896	By examination.	Walker.			
	June 1, 1896	By examination.	Victor.	Scranton	May 10, 1897	
	June 1, 1896	By examination.	Manning.			
	June 1, 1896	By examination.	Kennett.			
	June 1, 1896	By examination.	Clare.	Webster City	May 8, 1899	
	June 1, 1896	By examination.	Bialsburg.			
	June 1, 1896	Graduate.	Murray.			
	Aug. 1, 1897	Graduate.	Cherokee.	Cambridge	Mar. 1, 1899	
	Aug. 1, 1897	Graduate.	Story City.	Shandon	Nov. 1, 1899	
	Aug. 1, 1897	By examination.	Grinnell.			
	Dec. 1, 1897	By examination.	Des Moines.			
	Jan. 1, 1898	By examination.	Knoxville.			
	Jan. 1, 1898	By examination.	Centerville.			
	Jan. 1, 1898	By examination.	Fairbank.	Oslewin	May 18, 1899	
	Jan. 1, 1898	By examination.	Waterloo.	Carlisle	Oct. 11, 1899	
	Jan. 1, 1898	By examination.	Hammer.			
Galan, George W.	Dec. 1, 1897	By examination.				
Green, O. J.	Jan. 1, 1898	By examination.				
Green, O. J.	Jan. 1, 1898	By examination.				
Gowan, U. E.	Mar. 1, 1898	By examination.				

[illegible]

ABSTRACT—Continued.

Number of Certificate.	NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
1895	Haskell, George E.	Aug. 4, 1890	By examination.	Oelwein.	Decorah.	Mar. 22, 1893	Left the state.
1897		Aug. 2, 1890	By examination.	Des Moines.			
1899		Aug. 10, 1890	By examination.	Des Moines.			
1900		Aug. 31, 1890	By examination.	Ottumwa.	Hawarden.	May 22, 1895	
1725		Sept. 9, 1890	As owner.	Bartlett.			
1726		Sept. 14, 1890	As owner.	Keokuk.			
1731		Sept. 17, 1890	As owner.	Keokuk.			
1772		Oct. 10, 1890	As owner.	Monmouth.			
1785		Sept. 4, 1890	By examination.	Winthrop.			
1800		Oct. 24, 1890	By examination.	Cambridge.			
1801		Oct. 24, 1890	As owner.	Harvard.			
2008		Dec. 21, 1890	By examination.	West Side.	Elvertos.	Nov. 11, 1898	Out of business.
2009		Feb. 20, 1891	By examination.	Casey.			
2065		Feb. 20, 1891	By examination.	Scranton.	Guthrie Center.	Feb. 20, 1893	Out of business.
2067		Mar. 30, 1891	By examination.	Clarks ville.	Brunswick, Mo.	Jan. 27, 1893	Out of business.
3123		May 21, 1891	By examination.	Audubon.	D's Moines.	April 10, 1891	Out of business.
2071		July 10, 1891	By examination.	Cherokee.	Sioux City.		
2076		Aug. 24, 1891	By examination.	Gilman.	Rock Rapids.	Mar. 24, 1897	
2243		Nov. 11, 1891	Graduate.	Des Moines.	Dedham.	Mar. 24, 1893	Out of business.
2268		Nov. 10, 1891	By examination.	Audubon.			
2445		Feb. 23, 1893	By examination.	Stanton.			
2417		April 21, 1893	By examination.	Clinton.			
2429		May 6, 1893	By examination.	Irwin.			
2434		May 20, 1893	By examination.	Frederick.	Oaklafoos.	Mar. 10, 1897	Out of business.
2461		June 22, 1893	By examination.	Clarksdale.			
2464		June 2, 1893	By examination.	Oaawa.			
2496		July 2, 1893	By examination.	Strawberry Point.			
2440		Oct. 17, 1893	By examination.	Rose Hill.	Muchakinock.	July 2, 1894	Left the state.
2445		Dec. 1, 1893	By examination.	Dyserville.	Webster City.	April 9, 1897	Out of business.
2600		Feb. 10, 1894	By examination.	Collins.			
2602		Mar. 6, 1894	By examination.	West Branch.	Clarinda.	Oct. 14, 1894	Out of business.
2605		April 17, 1894	By examination.	Alberro.	Ottumwa.	Mar. 10, 1897	
2613		June 2, 1894	By examination.	Maynard.			
2615		July 2, 1894	By examination.	Des Moines.	Oedar Rapids.	May 9, 1893	
2625		July 27, 1894	By examination.	Fort Dodge.			
2704		Nov. 22, 1894	By examination.	Oreston.	Ottumwa.		

COMMISSIONERS OF PHARMACY.

89

2709	Dec. 18, 1893	By examination.	Le Mars.	Alta	April 7, 1897	Out of business.
2710	Jan. 20, 1894	By examination.	Greenfield	Glenwood.	Oct. 9, 1895	
2711	May 6, 1894	By examination.	Oskaloosa.			
2712	July 15, 1894	By examination.	West Liberty.			
2713	July 20, 1894	By examination.	Runnells.	Neola.	Sept. 23, 1895	Whitewood, S. D.
2714	Sept. 2, 1894	By examination.	Tama City.	Beaman.	April 23, 1896	
2715	Sept. 7, 1894	By examination.	Storm Lake.			
2716	Feb. 6, 1895	By examination.	Le Claire.			
2717	July 19, 1895	By examination.	Grundy Center.			
2718	Aug. 4, 1895	By examination.	Ocheyedan.	(Ocheyedan only.)		
2719	Oct. 19, 1895	By examination.	Persla.			
2720	Feb. 2, 1896	By examination.	Sheldon.			
2721	June 14, 1896	By examination.	Fairfield.	Elira.	Feb. 6, 1900	In Denver.
2722	Aug. 3, 1896	By examination.	Audubon.	Burt.	Dec. 9, 1898	
2723	Aug. 19, 1896	By examination.	Lake City.			
2724	Oct. 19, 1896	By examination.	Muscataine.			
2725	Dec. 21, 1896	By examination.	Humboldt.			
2726	Feb. 1, 1897	By examination.	Belmond.			
2727	Feb. 23, 1897	By examination.	Gladbrook.			
2728	Feb. 23, 1897	By examination.	Winfield.			
2729	Mar. 15, 1897	By examination.	Anamosa.			
2730	Mar. 15, 1897	By examination.	Guttenberg.			
2731	May 10, 1897	By examination.	Fort Dodge.			
2732	May 10, 1897	By examination.	Maynard.			
2733	April 19, 1897	By examination.	Iowa Falls.	Marion.	April 12, 1899	Out of business.
2734	May 17, 1897	By examination.	Hampton.	Fort Dodge.	Mar. 4, 1897	
2735	May 21, 1897	By examination.	Newell.	Chicago		
2736	July 4, 1897	By examination.	Council Bluffs.			
2737	Sept. 6, 1897	By examination.	Marengo.			
2738	Sept. 20, 1897	By examination.	Oreston.	Waverly	Mar. 10, 1900	
2739	Oct. 23, 1897	By examination.	Storm Lake.	Larabee.	July 14, 1896	
2740	Oct. 23, 1897	By examination.	Bloomfield.	Red Oak.	Mar. 15, 1900	
2741	Nov. 17, 1897	By examination.	Sioux City.			
2742	Dec. 20, 1897	By examination.	Griannel.			
2743	Feb. 1, 1898	By examination.	Bloomfield.			
2744	Feb. 15, 1898	By examination.	Elkader.			
2745	Mar. 20, 1898	By examination.	Indianola.			
2746	Mar. 27, 1898	By examination.	West Liberty.			
2747	Mar. 27, 1898	By examination.	Boone.	Leola.	Sept. 11, 1899	In Nebraska.
2748	April 15, 1898	By examination.	Missouri Valley.			
2749	May 1, 1898	By examination.	Auburn.	Laurens.	June 17, 1899	Out of business.
2750	May 7, 1898	By examination.	Burlington.			
2751	Aug. 7, 1898	By examination.	Avoca.			
2752	Sept. 7, 1898	By examination.	Orange City.	Hull.	July 19, 1900	In Montana.
2753	Mar. 6, 1899	By examination.	Webster City.			
2754	Mar. 10, 1899	By examination.	Rockwell.			
2755	April 10, 1899	By examination.	Hubbard.	Lake View	Sept. 2, 1899	
2756	May 21, 1899	By examination.	Storm Lake.	Des Moines.	Mar. 15, 1900	
2757	June 14, 1899	By examination.	Waterloo.			
2758	June 25, 1899	By examination.	Hampton.			

ABSTRACT—CONTINUED.

NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LAST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
Widow A F	July 16, 1890	Re examination.	Solon.....	(Solon only.)		
3662	Aug 16, 1890		Regdon.....	Council Bluffs.	April 13, 1898	
3704	Aug 20, 1890		Fredericksburg..	New Albion.....	Mar. 5, 1898	
3712	Aug 27, 1890		Ketchikan.....			
3718	Sept. 4, 1890		Clinton.....	Comanche.....	May 17, 1890	
3726	Oct. 16, 1890		Tamworth.....		April 9, 1890	
3774	Dec. 8, 1890		Ottawa.....		April 15, 1890	
3788	Dec 25, 1890		Rockwell.....		Mar. 15, 1898	
3806	Jan. 25, 1891		Wyoming.....		Oct. 22, 1890	
3807	Oct. 2, 1890		Orford.....		Oct. 5, 1890	
3825	Mar. 11, 1890		Orford Junction.		Jan. 8, 1891	
3851	Mar. 18, 1890		Misford Valley.....	Little Sioux.....		Out of business.
3853	Mar. 18, 1890		Des Moines.....			In Chicago.
3871	Mar. 18, 1890		Rockwell City.....			
3876	April 5, 1890		Mt. Ayr.....			
3879	April 17, 1890		Maning.....			
3885	April 22, 1890		Waterloo.....			
3890	April 22, 1890		Griswold.....			
3893	June 10, 1890		Bridgeport.....			
3875	Oct. 7, 1890		Port Dodge.....			
3876	Jan. 13, 1891		Minburn.....	Bloomfield.....	June 23, 1896	
3877	Jan. 23, 1891		Waterloo.....	Doon.....		
4009	Mar. 7, 1891		Marshall.....	Kelona.....	Mar. 10, 1898	
4013	Mar. 7, 1891		New Market.....	Clarinda.....	Dec. 5, 1898	
4018	Mar. 13, 1891		Leon.....			
4028	April 7, 1891		Washington.....			
4034	April 23, 1891		Davenport.....			
4041	April 23, 1891		Wesley.....			
4054	May 8, 1891		Debuque.....			
4060	May 24, 1891		Burlington.....			
4066	June 4, 1891		Grundy Center.....			
4068	June 16, 1891		Osmond.....			
4111	June 20, 1891		Bellevue.....	La Motte.....	Jan. 21, 1892	Out of business.
4130	Aug. 28, 1891					

4184	Hindorf, A. E.	Nov. 5, 1891	Dexter	Newton	May 14, 1892	Out of business.
4185	Henry, W. P.	Nov. 17, 1891	Nora Springs	Des Moines	Feb. 13, 1892	
4186	Hart, John L.	Nov. 17, 1891	Belmond	Klemme	Nov. 20, 1892	
4187	Hibbs, G. H.	Dec. 1, 1891	Fairfield	Stanhopa	Feb. 26, 1897	
4188	Hibbs, G. H.	Dec. 1, 1891	Mitchellville			
4189	Hibbs, G. H.	Jan. 20, 1892	Jewell Junction			
4190	Hibbs, G. H.	Feb. 12, 1892	Mt. Vernon			
4191	Hibbs, G. H.	Mar. 8, 1892	Storm Lake			
4192	Hibbs, G. H.	Mar. 24, 1892	Clinton			
4193	Hibbs, G. H.	Apr. 1, 1892	Des Moines	Marathon	June 21, 1892	Out of business.
4194	Hibbs, G. H.	Mar. 8, 1892	Ukaloosa	Vinton		
4195	Hibbs, G. H.	May 3, 1892	Williamsburg		Sept. 5, 1891	
4196	Hibbs, G. H.	May 10, 1892		Hartley	Mar. 21, 1894	
4197	Hibbs, G. H.	June 7, 1892				
4198	Hibbs, G. H.	June 24, 1892				
4199	Hibbs, G. H.	July 1, 1892				
4200	Hibbs, G. H.	July 8, 1892				
4201	Hibbs, G. H.	July 12, 1892				
4202	Hibbs, G. H.	Aug. 4, 1892				
4203	Hibbs, G. H.	Aug. 2, 1892		Marberry Point	Nov. 12, 1893	
4204	Hibbs, G. H.	Aug. 2, 1892		Exira	Mar. 19, 1896	
4205	Hibbs, G. H.	Aug. 2, 1892		Washita	Dec. 7, 1897	
4206	Hibbs, G. H.	Aug. 2, 1892		Guthrie Center	April 12, 1897	
4207	Hibbs, G. H.	Sept. 2, 1892				
4208	Hibbs, G. H.	Sept. 2, 1892				
4209	Hibbs, G. H.	Oct. 4, 1892				
4210	Hibbs, G. H.	Nov. 1, 1892		Jesup	June 25, 1897	
4211	Hibbs, G. H.	Dec. 20, 1892		Spencer	April 24, 1896	
4212	Hibbs, G. H.	Jan. 2, 1893		Cedar Rapids	May 6, 1898	
4213	Hibbs, G. H.	Jan. 10, 1893		Roland	Mar. 10, 1894	
4214	Hibbs, G. H.	Mar. 7, 1893				
4215	Hibbs, G. H.	Mar. 18, 1893				
4216	Hibbs, G. H.	Mar. 20, 1893				
4217	Hibbs, G. H.	Apr. 4, 1893				
4218	Hibbs, G. H.	June 25, 1893				
4219	Hibbs, G. H.	July 5, 1893				
4220	Hibbs, G. H.	Aug. 2, 1893				
4221	Hibbs, G. H.	Dec. 2, 1893				
4222	Hibbs, G. H.	Feb. 4, 1894				
4223	Hibbs, G. H.	Feb. 6, 1894				
4224	Hibbs, G. H.	Feb. 6, 1894				
4225	Hibbs, G. H.	Mar. 6, 1894				
4226	Hibbs, G. H.	Apr. 27, 1894				
4227	Hibbs, G. H.	Apr. 27, 1894	Clarion			South Dakota
4228	Hibbs, G. H.	May 1, 1894	Anamosa			
4229	Hibbs, G. H.	May 1, 1894	Alton			
4230	Hibbs, G. H.	May 1, 1894	Chancey			
4231	Hibbs, G. H.	June 2, 1894	Elliot			
4232	Hibbs, G. H.	July 2, 1894	Mystic			
4233	Hibbs, G. H.	Sept. 4, 1894	Waterloo			
4234	Hibbs, G. H.	Sept. 4, 1894				
4235	Hibbs, G. H.	Sept. 4, 1894				
4236	Hibbs, G. H.	Sept. 4, 1894				
4237	Hibbs, G. H.	Sept. 4, 1894				
4238	Hibbs, G. H.	Sept. 4, 1894				
4239	Hibbs, G. H.	Sept. 4, 1894				
4240	Hibbs, G. H.	Sept. 4, 1894				
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4257	Hibbs, G. H.	Sept. 4, 1894				
4258	Hibbs, G. H.	Sept. 4, 1894				
4259	Hibbs, G. H.	Sept. 4, 1894				
4260	Hibbs, G. H.	Sept. 4, 1894				
4261	Hibbs, G. H.	Sept. 4, 1894				
4262	Hibbs, G. H.	Sept. 4, 1894				
4263	Hibbs, G. H.	Sept. 4, 1894				
4264	Hibbs, G. H.	Sept. 4, 1894				
4265	Hibbs, G. H.	Sept. 4, 1894				
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4277	Hibbs, G. H.	Sept. 4, 1894				
4278	Hibbs, G. H.	Sept. 4, 1894				
4279	Hibbs, G. H.	Sept. 4, 1894				
4280	Hibbs, G. H.	Sept. 4, 1894				
4281	Hibbs, G. H.	Sept. 4, 1894				
4282	Hibbs, G. H.	Sept. 4, 1894				
4283	Hibbs, G. H.	Sept. 4, 1894				
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4297	Hibbs, G. H.	Sept. 4, 1894				
4298	Hibbs, G. H.	Sept. 4, 1894				
4299	Hibbs, G. H.	Sept. 4, 1894				
4300	Hibbs, G. H.	Sept. 4, 1894				
4301	Hibbs, G. H.	Sept. 4, 1894				
4302	Hibbs, G. H.	Sept. 4, 1894				
4303	Hibbs, G. H.	Sept. 4, 1894				
4304	Hibbs, G. H.	Sept. 4, 1894				
4305	Hibbs, G. H.	Sept. 4, 1894				
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4307	Hibbs, G. H.	Sept. 4, 1894				
4308	Hibbs, G. H.	Sept. 4, 1894				
4309	Hibbs, G. H.	Sept. 4, 1894				
4310	Hibbs, G. H.	Sept. 4, 1894				
4311	Hibbs, G. H.	Sept. 4, 1894				
4312	Hibbs, G. H.	Sept. 4, 1894				
4313	Hibbs, G. H.	Sept. 4, 1894				
4314	Hibbs, G. H.	Sept. 4, 1894				
4315	Hibbs, G. H.	Sept. 4, 1894				
4316	Hibbs, G. H.	Sept. 4, 1894				
4317	Hibbs, G. H.	Sept. 4, 1894				
4318	Hibbs, G. H.	Sept. 4, 1894				
4319	Hibbs, G. H.	Sept. 4, 1894				
4320	Hibbs, G. H.	Sept. 4, 1894				
4321	Hibbs, G. H.	Sept. 4, 1894				
4322	Hibbs, G. H.	Sept. 4, 1894				
4323	Hibbs, G. H.	Sept. 4, 1894				
4324	Hibbs, G. H.	Sept. 4, 1894				
4325	Hibbs, G. H.	Sept. 4, 1894				
4326	Hibbs, G. H.	Sept. 4, 1894				
4327	Hibbs, G. H.	Sept. 4, 1894				
4328	Hibbs, G. H.	Sept. 4, 1894				
4329	Hibbs, G. H.	Sept. 4, 1894				
4330	Hibbs, G. H.	Sept. 4, 1894				
4331	Hibbs, G. H.	Sept. 4, 1894				
4332	Hibbs, G. H.	Sept. 4, 1894				
4333	Hibbs, G. H.	Sept. 4, 1894				
4334	Hibbs, G. H.	Sept. 4, 1894				
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4339	Hibbs, G. H.	Sept. 4, 1894				
4340	Hibbs, G. H.	Sept. 4, 1894				
4341	Hibbs, G. H.	Sept. 4, 1894				
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4358	Hibbs, G. H.	Sept. 4, 1894				
4359	Hibbs, G. H.	Sept. 4, 1894				
4360	Hibbs, G. H.	Sept. 4, 1894				
4361	Hibbs, G. H.	Sept. 4, 1894				
4362	Hibbs, G. H.	Sept. 4, 1894				
4363	Hibbs, G. H.	Sept. 4, 1894				
4364	Hibbs, G. H.	Sept. 4, 1894				
4365	Hibbs, G. H.	Sept. 4, 1894				
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4379	Hibbs, G. H.	Sept. 4, 1894				
4380	Hibbs, G. H.	Sept. 4, 1894				
4381	Hibbs, G. H.	Sept. 4, 1894				
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4387	Hibbs, G. H.	Sept. 4, 1894				
4388	Hibbs, G. H.	Sept. 4, 1894				
4389	Hibbs, G. H.	Sept. 4, 1894				
4390	Hibbs, G. H.	Sept. 4, 1894				
4391	Hibbs, G. H.	Sept. 4, 1894				
4392	H					

ABSTRACT—CONTINUED.

[illegible]

6130	Aug.	4, 1896	By examination.	Sioux City.	Idora.	Mar. 17, 1899	Whitehead, S.
6131	Sept.	1, 1896	By examination.	Ft. Atkinson.	Alta Vista.	Feb. 27, 1899	
6132	Oct.	8, 1896	By examination.	Radcliffe.	Corning.	July 2, 1897	
6133	Oct.	8, 1896	By examination.	Grundy Center.			
6134	Nov.	4, 1896	By examination.	Grinnell.			
6135	Nov.	4, 1896	By examination.	Des Moines.			
6136	Jan.	20, 1897	By examination.	Des Moines.			
6137	Feb.	2, 1897	By examination.	Greenfield.			
6138	Mar.	2, 1897	By examination.	Clinton.			
6139	Mar.	2, 1897	By examination.	Strawberry Point.			
6140	Mar.	2, 1897	By examination.	Storm Lake.			
6141	April	6, 1897	By examination.	Carson.			
6142	May	4, 1897	By examination.	Ruthven.			
6143	May	4, 1897	By examination.	Cedar Rapids.			
6144	Aug.	2, 1897	By examination.	Oakland.			
6145	Aug.	2, 1897	By examination.	Early.			
6146	Sept.	1, 1897	By examination.	Clare.			
6147	Sept.	1, 1897	By examination.	Marshalltown.			
6148	Sept.	30, 1897	Graduate.	Des Moines.			
6149	Nov.	9, 1897	By examination.	Cedar Falls.			
6150	Nov.	9, 1897	By examination.	Red Oak.			
6151	Feb.	1, 1898	By examination.	Corning.			
6152	Mar.	1, 1898	By examination.	Dows.			
6153	Mar.	1, 1898	By examination.	Ottumwa.			
6154	Mar.	1, 1898	By examination.	Ottumwa.			
6155	April	5, 1898	By examination.				
6156	July	27, 1898	By examination.				
6157	July	27, 1898	By examination.				
6158	Aug.	2, 1898	By examination.				
6159	Aug.	2, 1898	By examination.				
6160	Oct.	4, 1898	By examination.				
6161	Oct.	4, 1898	By examination.				
6162	Nov.	1, 1898	By examination.				
6163	Dec.	6, 1898	By examination.				
6164	Dec.	6, 1898	By examination.				
6165	Jan.	2, 1899	By examination.				
6166	Jan.	2, 1899	By examination.				
6167	Mar.	7, 1899	By examination.				
6168	April	4, 1899	By examination.				
6169	April	4, 1899	By examination.				
6170	May	6, 1899	By examination.				
6171	May	6, 1899	By examination.				
6172	May	2, 1899	By examination.				
6173	May	2, 1899	By examination.				
6174	June	2, 1899	By examination.				
6175	June	2, 1899	By examination.				
6176	July	6, 1899	By examination.				
6177	July	6, 1899	By examination.				
6178	July	6, 1899	By examination.				
6179	July	6, 1899	By examination.				
6180	July	6, 1899	By examination.				
6181	Aug.	1, 1899	By examination.				
6182	Aug.	1, 1899	By examination.				

ABSTRACT—CONTINUED.

Number of certificate.	NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
1765	Huddleston, T. F.	Aug. 1, 1899	Graduate.	Sloan.	Henderson.	April 4, 1899	
1766		Aug. 28, 1899	As owner.	Denmark.			
1767		Aug. 28, 1899	By examination.	Elliott.			
1768		Aug. 28, 1899	By examination.	Roone.			
1769		April 17, 1899	By examination.	Menoketa.	Mitford.	Jan. 27, 1897	
1770		May 12, 1899	By examination.	Sergeant's Rings.	Goldfield.	Mar. 29, 1897	
1771		Nov. 20, 1899	By examination.	Des Moines.			
1772		Nov. 20, 1899	By examination.	(Brighton only).	Valley Junction.	Mar. 2, 1891	
1773		Feb. 17, 1891	By examination.	Des Moines.	Olin.	July 27, 1899	
1774		Nov. 1, 1892	By examination.	Oreco.	Indianola.	Aug. 26, 1897	
1775		Nov. 1, 1892	By examination.	Boone.			
1776		Dec. 12, 1892	By examination.	Zearing.			
1777		Nov. 2, 1894	By examination.	Waterloo.			
1778		Nov. 1, 1896	Graduate.	Watson.			
1779		June 19, 1899	As owner.	Carson.			
1780		June 19, 1899	As assistant.	Cedar Falls.			
1781		June 19, 1899	As assistant.	Des Moines.			
1782		June 19, 1899	As assistant.	Grimell.			
1783		June 19, 1899	As owner.	La Porte City.			
1784		June 19, 1899	As owner.	Oelwein.			
1785		June 19, 1899	As assistant.	Reinbeck.			
1786		June 19, 1899	As assistant.	Danville.			
1787		Aug. 27, 1899	As owner.	Perth.			
1788		Nov. 19, 1899	As owner.	Winthrop.			
1789		Sept. 20, 1899	By examination.	Denison.	Storm Lake.	June 21, 1893	
1790		Oct. 18, 1899	By examination.	Peoria City.	Atlantic.	April 16, 1895	
1791		July 31, 1899	By examination.	Waterloo.	Colfax.	Mar. 8, 1899	
1792		April 15, 1891	As assistant.	Wilton Junction.			
1793		April 7, 1891	By examination.	La Moille.	Ida Grove.	April 2, 1894	
1794		Dec. 6, 1893	By examination.	Worla.	Beaconsfield.	Aug. 25, 1894	
1795		Mar. 28, 1893	By examination.	Humboldt.	Pocahontas.	Nov. 25, 1895	
1796		April 17, 1893	By examination.	Breda.			
1797		June 1, 1893	By examination.	Olaton.			
1798		Feb. 18, 1894	By examination.	Preston.			
1799		Sept. 16, 1894	By examination.	Shenandoah.			
1800	Jay, George H.	Sept. 16, 1894	Graduate.	Des Moines.			
1801	Jackson, J. W.	Sept. 21, 1894	By examination.				In Missouri.

3176	.....	Mar. 17, 1897	By examination.....	Given.	Lowden.....	Jan. 15, 1899
3202	.....	Aug. 17, 1897	By examination.....	Mt. Pleasant.	.....	.....
3249	.....	Nov. 17, 1897	By examination.....	Olinos.....	.....	.....
3250	.....	Dec. 21, 1897	By examination.....	Des Moines.	Gurlington.....	Nov. 29, 1899
3271	.....	Jan. 1, 1898	By examination.....	Danville.....	Nora Springs.....	Jan. 5, 1899
3283	.....	Nov. 1, 1898	By examination.....	Stratford.....	.....	.....
3293	.....	Nov. 1, 1898	By examination.....	Des Moines.	.....	.....
3296	.....	Jan. 24, 1899	By examination.....	Cedar Falls.	.....	.....
3297	.....	April 16, 1899	By examination.....	Muscatine.....	.....	.....
3298	.....	May 7, 1899	By examination.....	Chariton.	.....	.....
3299	.....	Jan. 15, 1899	By examination.....	Clarinda.	.....	.....
3300	.....	Jan. 15, 1899	By examination.....	Luana.	.....	.....
3301	.....	Feb. 15, 1899	By examination.....	Roland.....	Petersen.....	April 25, 1899
3302	.....	Mar. 20, 1899	By examination.....	Gresco.	.....	.....
3304	.....	Mar. 31, 1899	By examination.....	.....	Lester.....	May 25, 1897
3305	.....	Sept. 2, 1899	By examination.....	.....	Des Moines.....	Nov. 24, 1899
3307	.....	Sept. 4, 1899	By examination.....	.....	Hudson.....	Sept. 1, 1899
3308	.....	Mar. 7, 1901	By examination.....	.....	.....	.....
3309	.....	June 9, 1891	By examination.....	.....	Prairie City.....	May 15, 1899
3310	.....	Aug. 24, 1891	By examination.....	.....	.....	.....
3311	.....	Sept. 1, 1891	By examination.....	.....	Arcadia.....	June 20, 1899
3312	.....	Jan. 25, 1892	By examination.....	.....	Red Oak.....	Feb. 6, 1899
3313	.....	Jan. 3, 1894	By examination.....	.....	Des Moines.....	June 25, 1899
3314	.....	Mar. 7, 1894	Graduate.....	.....	.....	.....
3315	.....	May 10, 1894	Graduate.....	.....	Volga City.....	Dec. 1, 1897
3316	.....	Oct. 6, 1894	By examination.....	Des Moines.	Uniontown.....	April 17, 1894
3317	.....	Dec. 24, 1894	By examination.....	Manson.	.....	.....
3318	.....	Feb. 27, 1895	By examination.....	Clarinda.....	Albia.....	Mar. 21, 1899
3319	.....	May 2, 1895	By examination.....	Jewell Junction.	Des Moines.....	June 1, 1899
3320	.....	Nov. 23, 1895	By examination.....	Sigourney.	.....	.....
3321	.....	Jan. 24, 1896	By examination.....	Carbon.....	Logan.....	Oct. 20, 1899
3322	.....	Mar. 15, 1896	Graduate.....	Des Moines.	.....	.....
3323	.....	May 1, 1896	By examination.....	Des Moines.	Iowa Falls.....	Mar. 22, 1899
3324	.....	June 25, 1896	By examination.....	Ackley.	.....	.....
3325	.....	Oct. 2, 1896	By examination.....	Carboe.	Manson.....	May 24, 1899
3326	.....	Oct. 2, 1896	By examination.....	Callender.	.....	.....
3327	.....	Feb. 9, 1896	By examination.....	Muscatine.....	Rawkeye.....	Aug. 25, 1899
3328	.....	Mar. 6, 1896	By examination.....	Mechanicsville.	Cedar Rapids.....	Dec. 18, 1899
3329	.....	Aug. 6, 1896	By examination.....	Keosauqua.	.....	.....
3330	.....	Dec. 2, 1896	By examination.....	Clarinda.	.....	.....
3331	.....	Aug. 4, 1896	By examination.....	Cedar Rapids.	.....	.....
3332	.....	Aug. 4, 1896	By examination.....	Le Mar.	Salt.....	Oct. 24, 1897
3333	.....	Sept. 1, 1896	By examination.....	Lenox.	.....	.....
3334	.....	Nov. 6, 1896	Graduate.....	Davenport.	.....	.....
3335	.....	Oct. 6, 1897	By examination.....	Toledo.	Shenandoah.....	Oct. 4, 1899
3336	.....	April 6, 1898	By examination.....	Red Oak.	.....	.....
3337	.....	April 5, 1898	By examination.....	Sioux Rapids.	Williamsburg.....	Jan. 24, 1899
3338	.....	July 27, 1898	Graduate.....	Muscatine.....	Adair.....	Feb. 1, 1899
3339	.....	Aug. 2, 1899	Graduate.....	Blackton.....	.....	.....

[illegible]

ABSTRACT—CONTINUED.

Number of certificate.	NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LAST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
4870	Kingery, J. K.	April 16, 1894	By examination.	Greston	Orient	Jan. 7, 1896	
4903	Kiesel, George.	July 9, 1893	By	Oresco			
4905	Kidd, Fred Z.	June 25, 1896	By	Oelwein	Allerton	Aug. 29, 1897	
4908	Knudson, L. O.	Dec. 17, 1896	By	Montout.			
4990	Kleis, H. W.	Feb. 11, 1896	By	Mock Rapids.			
5016	Kennedy, C. S.	Mar. 8, 1896	By	Logan.			
5025	Kucheman, E. F.	Mar. 24, 1896	By examination.	Bellevue	Meervey	July 15, 1896	
5029	Kinsinger, E. D.	April 7, 1896	By examination.	Bloomfield.			
5044	Kindall, Charles.	April 7, 1896	By examination.	Fredericksburg	Earville	Jan. 15, 1899	In Mexico.
5069	Kling, W. J.	April 6, 1894	By examination.	Le Mars.			
5117		June 10, 1894	By examination.		Burlington	Mar. 22, 1897	
5155		Nov. 1, 1896	By examination.				
5179		Dec. 14, 1897	By examination.				
5180		Dec. 14, 1897	By examination.				
5287		April 6, 1897	By examination.				
5290		July 8, 1897	By examination.				
5313		Aug. 2, 1897	By examination.				
5371		Dec. 7, 1897	By examination.				
5374		Jan. 4, 1898	By examination.				
5413		Mar. 1, 1898	By examination.		Auburn	Mar. 15, 1899	
5417		Mar. 1, 1898	By examination.		Carnayon	June 21, 1899	
5451		Mar. 1, 1898	By examination.		Fredericksburg	Mar. 23, 1899	
5450		Mar. 1, 1898	By examination.		West Union	Aug. 17, 1899	
5501		June 7, 1898	By examination.				
5502		July 27, 1898	By examination.				
5504		Aug. 3, 1898	By examination.				
5541		Aug. 3, 1898	By examination.				
5553		Sept. 7, 1898	By examination.				
5605		Dec. 6, 1898	By examination.		McCallieburg	Jan. 19, 1899	
5606		Jan. 2, 1899	By examination.		Bolfe	Mar. 2, 1899	
5623		April 4, 1899	By examination.				
5711		June 6, 1899	By examination.				
5716		June 6, 1899	By examination.				
5795		July 4, 1899	By examination.				
5797		Aug. 6, 1899	By examination.				

Aug. 1, 1898	By examination.....	Bayard.	1898		
June 1, 1898	As owner.....	Delaware.			
June 15, 1898	As assistant.....	Perry.			
June 16, 1898	As owner.....	Dubuque.			
June 20, 1898	As owner.....	Cascade.			
June 21, 1898	As owner.....	Popkinton.			
June 24, 1898	As owner.....	Des Moines.			
June 24, 1898	As owner.....	Des Moines.			
June 24, 1898	As owner.....	McClary Pleasant.			
June 17, 1898	As owner.....	McClary Pleasant.			
June 17, 1898	As principal.....	Ogare.			
June 18, 1898	As owner.....	Platteville.			
June 6, 1898	As owner.....	Marshalltown.			
June 26, 1898	As owner.....	Abingdon.			
June 28, 1898	As owner.....	Winfield.			
July 11, 1898	As owner.....	Danbury.			
July 20, 1898	As assistant.....	Stony City.			
Aug. 7, 1898	By examination.....	Davenport.			
Aug. 9, 1898	By examination.....	Clinton.			
Aug. 30, 1898	As owner.....	Des Moines.			
Jan. 3, 1891	As owner.....	Greenock.			
Dec. 20, 1890	By examination.....	Oedar Rapids.			
Feb. 7, 1891	By examination.....	Des Moines.			
April 11, 1891	By examination.....	Muscatine.....			
May 25, 1891	By examination.....	Leon.			
June 9, 1891	By examination.....	O. O.			
Sept. 23, 1891	By examination.....	Webster City.			
Sept. 23, 1891	By examination.....	Marshalltown.			
Sept. 19, 1891	By examination.....	Villisca.			
Dec. 19, 1891	By examination.....	Webster City.			
April 4, 1892	By examination.....	Casey.			
May 25, 1892	By examination.....	Marion.			
June 9, 1892	By examination.....	Lake City.			
Sept. 6, 1892	By examination.....	Dekatur.....			
Sept. 14, 1892	By examination.....	Waukeeta.			
Dec. 19, 1892	By examination.....	Ripley.			
April 20, 1893	By examination.....	Oceola.			
May 20, 1893	By examination.....	Oceola.			
Aug. 3, 1893	By examination.....	Lawler.			
May 20, 1894	By examination.....	Iowa City.			
June 6, 1894	Graduate.....	Oedar Falls.			
June 20, 1894	By examination.....	Columbus Junction.....			
Sept. 2, 1894	By examination.....	Luverne.			
Dec. 16, 1894	By examination.....	Charles City.			
April 6, 1895	By examination.....	Sheldahl.....			
July 6, 1895	By examination.....	Oceola.			
Sept. 15, 1895	By examination.....	Des Moines.			
Oct. 4, 1895	By examination.....	Independence.			
Oct. 16, 1895	By examination.....	Waterloo.			
Jan. 18, 1897	By examination.....	Lone Tree.....			
Feb. 1, 1897	By examination.....	Monroe.			
Feb. 1, 1897	By examination.....	Hawarden.			
Aug. 1, 1898	By examination.....	Bayard.			
June 1, 1898	As owner.....	Delaware.			
June 15, 1898	As assistant.....	Perry.			
June 16, 1898	As owner.....	Dubuque.			
June 20, 1898	As owner.....	Cascade.			
June 21, 1898	As owner.....	Popkinton.			
June 24, 1898	As owner.....	Des Moines.			
June 24, 1898	As owner.....	Des Moines.			
June 24, 1898	As owner.....	McClary Pleasant.			
June 24, 1898	As owner.....	McClary Pleasant.			
June 17, 1898	As owner.....	Ogare.			
June 17, 1898	As principal.....	Platteville.			
June 18, 1898	As owner.....	Marshalltown.			
June 6, 1898	As owner.....	Abingdon.			
June 26, 1898	As owner.....	Winfield.			
June 28, 1898	As owner.....	Danbury.			
July 11, 1898	As owner.....	Stony City.			
July 20, 1898	As assistant.....	Davenport.			
Aug. 7, 1898	By examination.....	Clinton.			
Aug. 9, 1898	By examination.....	Clinton.			
Aug. 30, 1898	As owner.....	Des Moines.			
Jan. 3, 1891	As owner.....	Greenock.			
Dec. 20, 1890	By examination.....	Oedar Rapids.			
Feb. 7, 1891	By examination.....	Des Moines.			
April 11, 1891	By examination.....	Muscatine.....			
May 25, 1891	By examination.....	Leon.			
June 9, 1891	By examination.....	O. O.			
Sept. 23, 1891	By examination.....	Webster City.			
Sept. 23, 1891	By examination.....	Marshalltown.			
Sept. 19, 1891	By examination.....	Villisca.			
Dec. 19, 1891	By examination.....	Webster City.			
April 4, 1892	By examination.....	Casey.			
May 25, 1892	By examination.....	Marion.			
June 9, 1892	By examination.....	Lake City.			
Sept. 6, 1892	By examination.....	Dekatur.....			
Sept. 14, 1892	By examination.....	Waukeeta.			
Dec. 19, 1892	By examination.....	Ripley.			
April 20, 1893	By examination.....	Oceola.			
May 20, 1893	By examination.....	Oceola.			
Aug. 3, 1893	By examination.....	Lawler.			
May 20, 1894	By examination.....	Iowa City.			
June 6, 1894	Graduate.....	Oedar Falls.			
June 20, 1894	By examination.....	Columbus Junction.....			
Sept. 2, 1894	By examination.....	Luverne.			
Dec. 16, 1894	By examination.....	Charles City.			
April 6, 1895	By examination.....	Sheldahl.....			
July 6, 1895	By examination.....	Oceola.			
Sept. 15, 1895	By examination.....	Des Moines.			
Oct. 4, 1895	By examination.....	Independence.			
Oct. 16, 1895	By examination.....	Waterloo.			
Jan. 18, 1897	By examination.....	Lone Tree.....			
Feb. 1, 1897	By examination.....	Monroe.			
Feb. 1, 1897	By examination.....	Hawarden.			
Aug. 1, 1898	By examination.....	Bayard.			
June 1, 1898	As owner.....	Delaware.			
June 15, 1898	As assistant.....	Perry.			
June 16, 1898	As owner.....	Dubuque.			
June 20, 1898	As owner.....	Cascade.			
June 21, 1898	As owner.....	Popkinton.			
June 24, 1898	As owner.....	Des Moines.			
June 24, 1898	As owner.....	Des Moines.			
June 24, 1898	As owner.....	McClary Pleasant.			
June 24, 1898	As owner.....	McClary Pleasant.			
June 17, 1898	As owner.....	Ogare.			
June 17, 1898	As principal.....	Platteville.			
June 18, 1898	As owner.....	Marshalltown.			
June 6, 1898	As owner.....	Abingdon.			
June 26, 1898	As owner.....	Winfield.			
June 28, 1898	As owner.....	Danbury.			
July 11, 1898	As owner.....	Stony City.			
July 20, 1898	As assistant.....	Davenport.			
Aug. 7, 1898	By examination.....	Clinton.			
Aug. 9, 1898	By examination.....	Clinton.			
Aug. 30, 1898	As owner.....	Des Moines.			
Jan. 3, 1891	As owner.....	Greenock.			
Dec. 20, 1890	By examination.....	Oedar Rapids.			
Feb. 7, 1891	By examination.....	Des Moines.			
April 11, 1891	By examination.....	Muscatine.....			
May 25, 1891	By examination.....	Leon.			
June 9, 1891	By examination.....	O. O.			
Sept. 23, 1891	By examination.....	Webster City.			
Sept. 23, 1891	By examination.....	Marshalltown.			
Sept. 19, 1891	By examination.....	Villisca.			
Dec. 19, 1891	By examination.....	Webster City.			
April 4, 1892	By examination.....	Casey.			
May 25, 1892	By examination.....	Marion.			
June 9, 1892	By examination.....	Lake City.			
Sept. 6, 1892	By examination.....	Dekatur.....			
Sept. 14, 1892	By examination.....	Waukeeta.			
Dec. 19, 1892	By examination.....	Ripley.			
April 20, 1893	By examination.....	Oceola.			
May 20, 1893	By examination.....	Oceola.			
Aug. 3, 1893	By examination.....	Lawler.			
May 20, 1894	By examination.....	Iowa City.			
June 6, 1894	Graduate.....	Oedar Falls.			
June 20, 1894	By examination.....	Columbus Junction.....			
Sept. 2, 1894	By examination.....	Luverne.			
Dec. 16, 1894	By examination.....	Charles City.			
April 6, 1895	By examination.....	Sheldahl.....			
July 6, 1895	By examination.....	Oceola.			
Sept. 15, 1895	By examination.....	Des Moines.			
Oct. 4, 1895	By examination.....	Independence.			
Oct. 16, 1895	By examination.....	Waterloo.			
Jan. 18, 1897	By examination.....	Lone Tree.....			
Feb. 1, 1897	By examination.....	Monroe.			
Feb. 1, 1897	By examination.....	Hawarden.			
Aug. 1, 1898	By examination.....	Bayard.			
June 1, 1898	As owner.....	Delaware.			
June 15, 1898	As assistant.....	Perry.			
June 16, 1898	As owner.....	Dubuque.			
June 20, 1898	As owner.....	Cascade.			
June 21, 1898	As owner.....	Popkinton.			
June 24, 1898	As owner.....	Des Moines.			
June 24, 1898	As owner.....	Des Moines.			
June 24, 1898	As owner.....	McClary Pleasant.			
June 24, 1898	As owner.....	McClary Pleasant.			
June 17, 1898	As owner.....	Ogare.			
June 17, 1898	As principal.....	Platteville.			
June 18, 1898	As owner.....	Marshalltown.			
June 6, 1898	As owner.....	Abingdon.			
June 26, 1898	As owner.....	Winfield.			
June 28, 1898	As owner.....	Danbury.			
July 11, 1898	As owner.....	Stony City.			
July 20, 1898	As assistant.....	Davenport.			
Aug. 7, 1898	By examination.....	Clinton.			
Aug. 9, 1898	By examination.....	Clinton.			
Aug. 30, 1898	As owner.....	Des Moines.			
Jan. 3, 1891	As owner.....	Greenock.			
Dec. 20, 1890	By examination.....	Oedar Rapids.			
Feb. 7, 1891	By examination.....	Des Moines.			
April 11, 1891	By examination.....	Muscatine.....			
May 25, 1891	By examination.....	Leon.			
June 9, 1891	By examination.....	O. O.			
Sept. 23, 1891	By examination.....	Webster City.			
Sept. 23, 1891	By examination.....	Marshalltown.			
Sept. 19, 1891	By examination.....	Villisca.			
Dec. 19, 1891	By examination.....	Webster City.			
April 4, 1892	By examination.....	Casey.			
May 25, 1892	By examination.....	Marion.			
June 9, 1892	By examination.....	Lake City.			
Sept. 6, 1892	By examination.....	Dekatur.....			
Sept. 14, 1892	By examination.....	Waukeeta.			
Dec. 19, 1892	By examination.....	Ripley.			
April 20, 1893	By examination.....	Oceola.			
May 20, 1893	By examination.....	Oceola.			
Aug. 3, 1893	By examination.....	Lawler.			
May 20, 1894	By examination.....	Iowa City.			
June 6, 1894	Graduate.....	Oedar Falls.			
June 20, 1894	By examination.....	Columbus Junction.....			
Sept. 2, 1894	By examination.....	Luverne.			
Dec. 16, 1894	By examination.....	Charles City.			
April 6, 1895	By examination.....	Sheldahl.....			
July 6, 1895	By examination.....	Oceola.			
Sept. 15, 1895	By examination.....	Des Moines.			
Oct. 4, 1895	By examination.....	Independence.			
Oct. 16, 1895	By examination.....	Waterloo.			
Jan. 18, 1897	By examination.....	Lone Tree.....			
Feb. 1, 1897	By examination.....	Monroe.			
Feb. 1, 1897	By examination.....	Hawarden.			
Aug. 1, 1898	By examination.....	Bayard.			
June 1, 1898	As owner.....	Delaware.			
June 15, 1898	As assistant.....	Perry.			
June 16, 1898	As owner.....	Dubuque.			
June 20, 1898	As owner.....	Cascade.			
June 21, 1898	As owner.....	Popkinton.			
June 24, 1898	As owner.....	Des Moines.			
June 24, 1898	As owner.....	Des Moines.			
June 24, 1898	As owner.....	McClary Pleasant.			
June 24, 1898	As owner.....	McClary Pleasant.			
June 17, 1898	As owner.....	Ogare.			
June 17, 1898	As principal.....	Platteville.			
June 18, 1898	As owner.....	Marshalltown.			
June 6, 1898	As owner.....	Abingdon.			
June 26, 1898	As owner.....	Winfield.			
June 28, 1898	As owner.....	Danbury.			
July 11, 1898	As owner.....	Stony City.			
July 20, 1898	As assistant.....	Davenport.			
Aug. 7, 1898	By examination.....	Clinton.			
Aug. 9, 1898	By examination.....	Clinton.			
Aug. 30, 1898	As owner.....	Des Moines.			
Jan. 3, 1891	As owner.....	Greenock.			
Dec. 20, 1890	By examination.....	Oedar Rapids.			
Feb. 7, 1891	By examination.....	Des Moines.			
April 11, 1891	By examination.....	Muscatine.....			
May 25, 1891	By examination.....	Leon.			
June 9, 1891	By examination.....	O. O.			
Sept. 23, 1891	By examination.....	Webster City.			
Sept. 23, 1891	By examination.....	Marshalltown.			
Sept. 19, 1891	By examination.....	Villisca.			
Dec. 19, 1891	By examination.....	Webster City.			
April 4, 1892	By examination.....	Casey.			
May 25, 1892	By examination.....	Marion.			
June 9, 1892	By examination.....	Lake City.			
Sept. 6, 1892	By examination.....	Dekatur.....			
Sept. 14, 1892	By examination.....	Waukeeta.			
Dec. 19, 1892	By examination.....	Ripley.			
April 20, 1893	By examination.....	Oceola.			
May 20, 1893	By examination.....	Oceola.			
Aug. 3, 1893	By examination.....	Lawler.			
May 20, 1894	By examination.....	Iowa City.			
June 6, 1894	Graduate.....	Oedar Falls.			
June 20, 1894	By examination.....	Columbus Junction.....			
Sept. 2, 1894	By examination.....	Luverne.			
Dec. 16, 1894	By examination.....	Charles City.			
April 6, 1895	By examination.....	Sheldahl.....			
July 6, 1895	By examination.....	Oceola.			
Sept. 15, 1895	By examination.....	Des Moines.			
Oct. 4, 1895	By examination.....	Independence.			
Oct. 16, 1895	By examination.....	Waterloo.			
Jan. 18, 1897	By examination.....	Lone Tree.....			
Feb. 1, 1897	By examination.....	Monroe.			
Feb. 1, 1897	By examination.....	Hawarden.			
Aug. 1, 1898	By examination.....	Bayard.			
June 1, 1898	As owner.....	Delaware.			
June 15, 1898	As assistant.....	Perry.			

ABSTRACT—CONTINUED.

Number of certificate.	NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
3194	Landis, Jesse E.	Feb. 13, 1897	By examination	Murray	Osceola	Jan. 7, 1894	
3223	May 2, 1897	By examination	Valer	(For Yale only).	.....
3265	June 7, 1897	By examination	Larkin	.....	.....	Out of business.
3290	Aug. 5, 1897	By examination	Garrison	.....	.....
3295	Aug. 14, 1897	By examination	Wellman	.....	.....
3306	Sept. 1, 1897	By examination	Guthrie Center.	.....	.....
3394	Jan. 17, 1898	By examination	Lamont	.....	.....
3454	Feb. 23, 1898	By examination	Winfield	.....	.....
3472	May 14, 1898	By examination	Dubuque	.....	.....
3485	June 13, 1898	By examination	Iowa City	.....	.....	In Missouri.
3490	July 17, 1898	By examination	Marshalltown	.....	.....
3501	Aug. 8, 1898	By examination	Boone	.....	.....
3513	Lawhead, W. E.	Aug. 28, 1898	By examination	.....	Sioux City	Mar. 4, 1899	
3531	Lawrence, E. B.	Sept. 11, 1898	By examination	.....	Perry	Mar. 13, 1897	
3539	Mar. 13, 1899	By examination	.....	.....	.....	Out of business.
3539	April 9, 1899	By examination	.....	Elmer City	May 23, 1898	
3553	May 21, 1899	By examination	.....	Sioux Rapids	Oct. 14, 1899	
3590	Aug. 4, 1899	By examination	.....	.....	.....
3716	Aug. 23, 1899	By examination	.....	Greenfield	Oct. 23, 1898	
3729	Sept. 13, 1899	By examination	.....	.....	.....	In Chicago.
3761	Oct. 15, 1899	By examination	.....	.....	.....
3773	Dec. 9, 1899	By examination	.....	.....	.....
3790	Dec. 22, 1899	By examination	.....	.....	.....
3793	Jan. 2, 1900	By examination	.....	Keokuk	.....	Out of business.
3803	Jan. 24, 1900	By examination	.....	.....	Oct. 30, 1890	
3829	Feb. 23, 1900	By examination	.....	.....	.....
3836	Mar. 13, 1900	By examination	.....	Denison	Mar. 2, 1903	
3854	July 23, 1900	By examination	.....	Vinton	Nov. 23, 1900	
3900	Sept. 3, 1900	By examination	Garrison	Greenfield	June 2, 1899	
3925	Nov. 13, 1900	By examination	.....	Westpoint	Oct. 3, 1899	
4043	May 19, 1901	By examination	.....	.....	.....
4049	May 19, 1901	By examination	.....	.....	.....
4077	Aug. 10, 1901	By examination	.....	.....	.....
4127	Oct. 10, 1901	By examination	.....	.....	.....
4201	Aug. 17, 1902	Graduate	.....	.....	.....

ABSTRACT.

NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
4481 N. K. B. of C. of	April 5, 1898	By examination.	.....	.....	.....	.....
4482 Lomas, E. T.	April 5, 1898	.....	.....	.....	.....	.....
4483 Loytze, F. C.	April 5, 1898	.....	.....	.....	.....	.....
4484 Langdon, Olat.	Aug. 2, 1898	.....	.....	.....	.....	.....
4485 Large, A. F.	Aug. 7, 1898	.....	.....	.....	.....	.....
4486 Lott, H. V.	Sept. 7, 1898	.....	.....	.....	.....	.....
4487 Le Gore, J. F.	Dec. 4, 1898	.....	.....	.....	.....	.....
4488 Letson, G. A.	Dec. 6, 1898	.....	.....	.....	.....	.....
4489 Linn, O. A.	Feb. 7, 1899	.....	.....	.....	.....	.....
4490 Le Fevre, L. K.	April 29, 1899	.....	.....	.....	.....	.....
4491	April 29, 1899	.....	.....	.....	.....	.....
4492	June 6, 1899	Graduate.	.....	.....	.....	.....
4493	June 6, 1899	Graduate.	.....	.....	.....	.....
4494	July 6, 1899	Graduate.	.....	.....	.....	.....
4495	July 6, 1899	By examination.	.....	.....	.....	.....
4496	July 6, 1899	Graduate.	.....	.....	.....	.....
4497	Aug. 1, 1899	Graduate.	.....	.....	.....	.....
4498	June 14, 1899	As owner.	.....	.....	.....	.....
4499	June 4, 1899	As owner.	.....	.....	.....	.....
4500	June 10, 1899	As owner.	.....	.....	.....	.....
4501	June 10, 1899	As owner.	.....	.....	.....	.....
4502	June 3, 1899	As assistant.	.....	.....	.....	.....
4503	June 7, 1899	As owner.	.....	.....	.....	.....
4504	July 17, 1899	As owner.	.....	.....	.....	.....
4505	June 17, 1899	As owner.	.....	.....	.....	.....
4506	June 9, 1899	As owner.	.....	.....	.....	.....
4507	June 7, 1899	As assistant.	.....	.....	.....	.....
4508	June 28, 1899	As owner.	.....	.....	.....	.....
4509	June 28, 1899	As owner.	.....	.....	.....	.....
4510	June 7, 1899	As owner.	.....	.....	.....	.....
4511 Morden, W. C.	June 7, 1899	As owner.	.....	.....	.....	Beatrice, Neb.
4512 Mann, James.	June 23, 1899	As owner.	.....	.....	.....	.....
4513 Montgomery, W. H.	June 23, 1899	As owner.	.....	.....	.....	Out of business.
4514 Markley, G. H.	June 9, 1899	As owner.	.....	.....	.....	Out of business.
4515 Munger, J. P.	June 4, 1899	As owner.	.....	.....	.....	Out of business.
4516 Mallory, D. W.	July 2, 1899	As owner.	.....	.....	.....	.....
4517 Mallory, Adela.	July 2, 1899	As assistant.	.....	.....	.....	.....
4518 Mills, A. H.	July 2, 1899	As owner.	.....	.....	.....	.....
4519	June 4, 1899	As owner.	.....	.....	.....	.....

1898	June 5, 1898	As owner.	Des Moines.	.....	.....	Left the state. in Kansas.
1899	June 5, 1899	As owner.	Oxford Junction.	.....	.....	.....
1900	June 5, 1900	As owner.	Terrill.	.....	Nov. 25, 1900	.....
1901	July 6, 1901	As owner.	Pleasantville.	.....	Mar. 10, 1901	Out of business.
1902	July 6, 1902	As owner.	.....	.....	.....	.....
1903	June 11, 1903	As owner.	.....	.....	.....	.....
1904	June 12, 1904	As owner.	Clearfield.	.....	Mar. 28, 1904	.....
1905	June 28, 1905	As owner.	Blairburg.	.....	Sept. 17, 1905	.....
1906	July 22, 1906	By examination.	Delta.	.....	Jan. 8, 1906	Out of business.
1907	July 22, 1907	By examination.	.....	.....	.....	.....
1908	Aug. 1, 1908	By examination.	.....	.....	.....	.....
1909	Aug. 1, 1909	By examination.	.....	.....	.....	.....
1910	Nov. 18, 1910	As assistant.	.....	.....	.....	.....
1911	Dec. 6, 1911	By	.....	.....	.....	.....
1912	Dec. 12, 1912	By	.....	.....	.....	.....
1913	April 23, 1913	By	.....	.....	.....	.....
1914	April 27, 1914	By	.....	.....	.....	.....
1915	April 27, 1915	By	.....	.....	.....	.....
1916	May 17, 1916	By	.....	.....	.....	.....
1917	May 17, 1917	By	.....	.....	.....	.....
1918	April 23, 1918	By	.....	.....	.....	.....
1919	April 23, 1919	By	.....	.....	.....	.....
1920	Nov. 11, 1920	By	.....	.....	.....	.....
1921	Dec. 2, 1921	By	.....	.....	.....	.....
1922	Aug. 21, 1922	By	.....	.....	.....	.....
1923	Jan. 27, 1923	By	.....	.....	.....	.....
1924	Jan. 27, 1924	By	.....	.....	.....	.....
1925	Mar. 2, 1925	By	.....	.....	.....	.....
1926	Apr. 2, 1926	By	.....	.....	.....	.....
1927	Jan. 21, 1927	By examination.	.....	.....	.....	.....
1928	Jan. 21, 1928	By examination.	.....	.....	.....	.....
1929	Feb. 5, 1929	By examination.	.....	.....	.....	.....
1930	May 20, 1930	By examination.	.....	.....	.....	.....
1931	July 15, 1931	By examination.	.....	.....	.....	.....
1932	Sept. 2, 1932	By examination.	.....	.....	.....	.....
1933	Oct. 2, 1933	By examination.	.....	.....	.....	.....
1934	Oct. 2, 1934	By examination.	.....	.....	.....	.....
1935	Mar. 14, 1935	By examination.	.....	.....	.....	.....
1936	Mar. 14, 1936	By examination.	.....	.....	.....	.....
1937	May 25, 1937	By examination.	.....	.....	.....	.....
1938	June 11, 1938	By examination.	.....	.....	.....	.....
1939	June 11, 1939	By examination.	.....	.....	.....	.....
1940	Sept. 7, 1940	By examination.	.....	.....	.....	.....
1941	Sept. 7, 1941	By examination.	.....	.....	.....	.....
1942	Oct. 16, 1942	By examination.	.....	.....	.....	.....
1943	Jan. 16, 1943	By examination.	.....	.....	.....	.....
1944	Feb. 16, 1944	By examination.	.....	.....	.....	.....
1945	Feb. 16, 1945	By examination.	.....	.....	.....	.....
1946	May 17, 1946	Graduate.	.....	.....	.....	.....
1947	May 17, 1947	Graduate.	.....	.....	.....	.....
1948	May 17, 1948	By examination.	.....	.....	.....	.....
1949	May 17, 1949	By examination.	.....	.....	.....	.....
1950	Sept. 7, 1950	By examination.	.....	.....	.....	.....
1951	Sept. 7, 1951	By examination.	.....	.....	.....	.....
1952	Oct. 6, 1952	By examination.	.....	.....	.....	.....
1953	Nov. 5, 1953	By examination.	.....	.....	.....	.....

MONROE CITY.
Wesley City.
Eagle Grove.
Mt. Ayr.
Charles City.

ABSTRACT—CONTINUED.

NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
Miller C E	Nov. 27, 1886	By examination.	Cedar Rapids.	Grinnell.	Feb. 11, 1893	Out of business.
1101	Dec. 17, 1886	By examination.	Ferry.			
2109	Mar. 20, 1887	By examination.	Avoca.			
2185	April 5, 1887	By examination.	Bagley.	Minburn.	Aug. 17, 1893	
2307	April 19, 1887	By examination.	Goldfield.	Logan.	Aug. 15, 1893	
2322	Aug. 13, 1887	By examination.	Cromwell.			
2390	Jan. 18, 1888	By examination.	Holland.			
2395	Feb. 7, 1888	By examination.	Wayland.			
2373	Feb. 1, 1888	By examination.	Angus.	Sioux City.	Aug. 27, 1897	
2373	Feb. 1, 1888	By examination.	Washita.			
2382	Feb. 9, 1888	By examination.	Lenox.			
2385	Feb. 13, 1888	By examination.	Marion.			
2423	Mar. 20, 1888	By examination.	Malvern.			In Nebraska.
2443	April 17, 1888	By examination.	Stanton.			
2448	Sept. 23, 1887	By examination.	Ottumwa.	Adair.	April 1, 1899	
2430	May 9, 1888	Graduate.	Greenfield.			
2510	Aug. 21, 1888	By examination.	Reinbeck.			
2513	Aug. 24, 1888	By examination.	Cedar Falls.	Valeria	Nov. 15, 1893	Out of business.
2526	Sept. 4, 1888	By examination.	Delta.	Crystal Lake	Nov. 9, 1893	
2539	Oct. 4, 1888	By examination.	Galva.	Olemons.	Oct. 10, 1893	
2564	Dec. 1, 1888	By examination.	Albion			
2571	Jan. 1, 1889	By examination.	Columbus City.			
2575	Jan. 2, 1889	By examination.	Audubon.			
2613	Mar. 6, 1890	By examination.	Iowa City.	Liscomb.	April 6, 1897	In Nebraska.
2619	Mar. 12, 1890	By examination.	Bayard.	Iona.	May 28, 1891	
2720	Sept. 8, 1890	By examination.	Plainfield.			
2743	Oct. 1, 1890	By examination.	Des Moines.	West Liberty.	May 2, 1894	
2748	Oct. 1, 1890	By examination.	Atalissa.	Davenport.	Mar. 11, 1891	
2801	Jan. 23, 1890	By examination.	Des Moines.	Ames.	Feb. 9, 1890	
2800	Jan. 23, 1890	By examination.	Stanwood.			
2841	Mar. 4, 1890	By examination.	Dows.			
2844	Mar. 4, 1890	By examination.	Harlan.			
2844	Mar. 7, 1890	By examination.	Remsen.	Grinnell.	May 11, 1901	
2860	May 24, 1890	By examination.	Oreaso.			
2901	June 5, 1890	By examination.	Reinbeck.			
2902	Aug. 5, 1890	By examination.	Moorhead.			
2908	Sept. 2, 1890	By examination.	Galva.			
2947	Oct. 7, 1890	By examination.	Galva.			

2949	Oct. 10, 1893	Iowa City.....	Port Atkinson.....	Mar. 22, 1896	Out of business.
2950	Dec. 2, 1893	Sioux Center.....	Menlo.....	Jan. 11, 1894	
2951	Dec. 26, 1893	Marham.....			
2952	Mar. 7, 1894	Warlock.....			
2953	June 2, 1894	Weldon.....			
2954	Nov. 2, 1894	Ute.....			
2955	Jan. 23, 1895	Akron.....	Strubie.....	Feb. 25, 1896	
2956	Feb. 16, 1895	Stanhord.....			
2957	Mar. 5, 1895	Clinton.....	Council Bluffs.....	June 4, 1896	Out of business.
2958	Apr. 12, 1895	Iowa City.....			
2959	June 7, 1895	Atlantic.....			
2960	June 24, 1895	Des Moines.....			
2961	July 2, 1895	Algona.....	Spencer.....	Oct. 19, 1896	
2962	July 22, 1895	Pomeroy.....			
2963	Dec. 6, 1895	Fulaski.....			
2964	Feb. 6, 1896	Riverton.....			
2965	Mar. 14, 1896	Osslow.....			
2966	Apr. 11, 1896	Des Moines.....	Ridgeway.....	July 4, 1897	In South Dakota.
2967	May 4, 1896	Paulina.....			
2968	Aug. 4, 1896	Elles.....			
2969	Aug. 7, 1896	Dallas Center.....	Churdan.....	May 15, 1897	In Minnesota.
2970	Sept. 6, 1896	Sioux City.....			
2971	Sept. 12, 1896	Charles City.....			
2972	Sept. 18, 1896	Birmingham.....	Fairfield.....	Oct. 7, 1898	Out of business.
2973	Oct. 2, 1896	Iowa City.....			
2974	Oct. 27, 1896	Peymour.....			
2975	Nov. 7, 1896	Laurel.....			
2976	Mar. 4, 1897	Albia.....	Hampton.....	Jan. 8, 1899	
2977	Mar. 6, 1897	Adley.....			
2978	Mar. 12, 1897	Edgewood.....			
2979	Mar. 18, 1897	Edgerville.....			
2980	Apr. 1, 1897	Charles City.....	Allison.....	Aug. 6, 1899	
2981	Apr. 15, 1897	Adair Falls.....	Savaria.....	May 28, 1897	
2982	May 1, 1897	Fairfield.....			
2983	May 18, 1897	Frederick.....			
2984	July 1, 1897	St. Dodge.....			
2985	Sept. 4, 1897	Council Bluffs.....			
2986	Sept. 11, 1897	Mason.....			
2987	Oct. 1, 1897	Adair Falls.....			
2988	Nov. 9, 1897	Adair.....			
2989	Nov. 21, 1897	Council Bluffs.....			
2990	Dec. 2, 1897	Charles City.....	St. Ansgar.....	April 7, 1899	
2991	Mar. 4, 1898	Charfield.....	Lenoir.....	Nov. 2, 1899	
2992	Mar. 10, 1898	Des Moines.....			
2993	Mar. 19, 1898	Harshbarger.....	Crystal Lake.....	Nov. 28, 1899	
2994	Apr. 4, 1898	Jewell Junction.....			
2995	June 4, 1898	Redd.....			
2996	July 4, 1898	Lake View.....	Gray.....	Dec. 17, 1899	
2997	Oct. 1, 1898	Linton.....			
2998	Oct. 21, 1898	Des Moines.....			

ABSTRACT—CONTINUED.

Number of cer- tificates	NAME	DATE OF REGISTRA- TION.	HOW REGISTERED	PLACE OF REGISTRA- TION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
4979	Macy, O. E.	Jan. 7, 1893	By examination.	Pleasanton.			
5014	McArthur, Wallace.	Mar. 2, 1893	By examination.	La Mesa.			
5001	Munger, D. M.	April 7, 1893	By examination.	Waterloo.			
5004		April 21, 1893	By examination.	Conrad.		Aug. 9, 1899	
5070		May 5, 1893	By examination.	Cedar Rapids.	Parkersburg.	July 21, 1897	
5071		May 5, 1893	By examination.	Manon.	Iowa City.		
5081		May 5, 1893	By examination.	Moorehead.	Loburville.		
5089		June 2, 1893	By examination.	Iowa Falls.			
5103		June 11, 1893	By examination.	Akron.			
5114		July 1, 1893	By examination.	Forest City.			
5115		July 1, 1893	By examination.	Osage.			
5125		July 1, 1893	By examination.	Eldon.			
5155		Oct. 6, 1893	By examination.	Holland.			
5170		Nov. 10, 1893	By examination.	Estherville.			
5174		Dec. 1, 1893	By examination.	Leop.	Waterloo.	Mar. 5, 1899	
5175		Dec. 1, 1893	By examination.	Charlotte.			
5194		Dec. 1, 1893	By examination.	Janesville.	Oreston.	Mar. 31, 1898	
5200		Feb. 2, 1897	By examination.	Maquoket.			
5201		Feb. 2, 1897	By examination.	Dunn.			
5202		Feb. 2, 1897	By examination.	New Hampton.			
5203		Feb. 2, 1897	By examination.	La Mesa.			
5204		April 6, 1897	By examination.	Waterloo.			
5245		April 6, 1897	By examination.	Algona.	Fort Dodge.	Feb. 27, 1899	
5246		April 6, 1897	By examination.	Des Moines.	Burt.	May 24, 1899	
5250		May 4, 1897	By examination.	Burlington.			
5251		May 4, 1897	By examination.	Acquia.			
5252		May 4, 1897	By examination.	Stear City.			
5253		May 4, 1897	By examination.	Centerville.	Burlington.	Jan. 24, 1900	
5254		May 4, 1897	By examination.	Maynard.			
5255		May 4, 1897	By examination.	Alexander.	Badger.	May 2, 1900	
5256		May 4, 1897	By examination.	Atterbury.	Madison.	May 12, 1900	
5257		May 4, 1897	By examination.	Belle Plaine.	Delmar.	Feb. 12, 1900	
5258		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5259		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5260		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5261		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5262		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5263		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5264		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5265		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5266		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5267		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5268		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5269		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5270		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5271		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5272		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5273		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5274		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5275		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5276		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5277		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5278		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5279		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5280		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5281		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5282		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5283		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5284		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5285		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5286		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5287		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5288		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5289		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5290		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5291		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5292		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5293		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5294		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5295		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5296		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5297		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5298		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5299		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	
5300		May 4, 1897	By examination.	Elgin.	Wayland.	April 28, 1900	

ABSTRACT—CONTINUED.

Number of certificates.	NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
3500	A. W. Farland, A. W.	Jan. 6, 1896	By examination.				
3573		Sept. 12, 1896	By examination.				
3177		Mar. 1, 1897	By examination.				
3170		Mar. 8, 1897	By examination.				
3359		May 17, 1897	By examination.				
3404		Feb. 24, 1898	By examination.				
3507		Mar. 5, 1899	Graduate.		Milton	Nov. 1, 1895	
3434		April 2, 1899	By examination.				
3581		May 21, 1899	By examination.				
3796		Sept. 17, 1899	By examination.				
3698		April 21, 1900	By examination.		Gravity	June 23, 1898	
3801		June 24, 1900	By examination.		Grinnell	May 11, 1901	
4047		May 5, 1901	By examination.		Algona	May 12, 1900	
4105		Sept. 2, 1901	Graduate		Churdan	Nov. 21, 1905	
4152		Nov. 2, 1901	By examination.				
4145		Nov. 23, 1901	By examination.				
4160		Feb. 1, 1902	By examination.	La Porte			
4345		June 7, 1902	By examination.	Bele Plaine	West Side	Oct. 10, 1898	
4360		July 7, 1902	By examination.	Des Moines			
4361		Aug. 2, 1902	By examination.	Swan	Atos	Feb. 16, 1907	
4381		Oct. 4, 1902	By examination.	Shellsburg			
4409		Mar. 7, 1903	By examination.	Grinnell			
4432		April 4, 1903	By examination.	D. S. Moines			
4433		April 21, 1903	By examination.	Cedar Rapids			
4443		May 9, 1903	By examination.	Rock Valley	West Union	Mar. 21, 1904	
4453		May 20, 1903	By examination.	Lost Nation	Delmar	Aug. 1, 1905	
4460		May 30, 1903	By examination.	Stymour			
4468		May 30, 1903	By examination.	Des Moines			
4501		Oct. 3, 1903	By examination.	Boone			
4443		Nov. 23, 1903	By examination.	Cascade	Maynard	April 25, 1904	
4411		Mar. 6, 1904	By examination.	Muscatine			
4397		April 17, 1904	By examination.	Olare	Ayahire	Aug. 24, 1904	
4600		June 5, 1904	By examination.	Lost Nation			
4667		May 5, 1905	By examination.	Des Moines			
4708		Oct. 20, 1904	By examination.	Vinton			
4841		Mar. 12, 1905	By examination.	Fontenelle	Anamosa	Aug. 2, 1907	
4971		April 27, 1904	By examination.	Gilmore City			

4878	April 21, 1884	By examination.	Greaton.....	Ottumwa.....	Aug. 2, 1888
4884	Oct. 1, 1885	By examination.	Alnaworth.....	Spirit Lake.....	Nov. 27, 1887
4891	Nov. 6, 1885	By examination.	Bedford.....		
4900	April 7, 1886	By examination.	Buffalo Center.....		
4901	Jan. 14, 1887	By examination.	Marble Rock.....		
4902	Jan. 14, 1887	By examination.	Victor.....	Clear Lake.....	May 2, 1888
4903	April 18, 1887	By examination.	Des Moines.....		
4907	July 8, 1887	By examination.	Emerson.....		
4918	Sept. 7, 1887	By examination.	Ft. Madison.....		
4920	Sept. 7, 1887	By examination.	Centerville.....		
4921	Jan. 4, 1888	By examination.	Des Moines.....	Holmes.....	Feb. 25, 1888
4923	Feb. 1, 1888	By examination.	New Hampton.....	Independence.....	Oct. 17, 1888
4924	April 5, 1888	By examination.	New Market.....		
4925	April 5, 1888	By examination.	College Springs.....		
4926	April 5, 1888	By examination.	Jefferson.....		
4927	April 5, 1888	By examination.	Webster.....		
4928	June 7, 1888	By examination.	Ft. Dodge.....		
4929	July 27, 1888	Graduate.	Adair.....	Humboldt.....	Aug. 21, 1888
4930	Sept. 7, 1888	Graduate.	Hartley.....		
4931	Nov. 1, 1888	By examination.	Lake City.....		
4932	Nov. 1, 1888	By examination.	Des Moines.....	Mitchell.....	Feb. 29, 1889
4933	April 4, 1889	Graduate.	Monticello.....		
4934	May 17, 1889	Graduate.	Brooklyn.....	Clear Lake.....	June 2, 1889
4935	July 6, 1889	Graduate.	Des Moines.....		
4936	Aug. 1, 1889	Graduate.	Independence.....		
4937	Aug. 1, 1889	Graduate.	Lake Mills.....		
4938	June 8, 1890	As owner.	Muscatine.....		
4939	June 10, 1890	As assistant.	Hartford.....		
4940	June 8, 1890	As owner.	Atlantic.....		
4941	June 4, 1890	As owner.	Atlantic.....		
4942	June 4, 1890	As owner.	Belle Plaine.....		
4943	June 24, 1890	As owner.	Oasey.....		
4944	June 8, 1890	As owner.	Kent.....		
4945	June 8, 1890	As owner.	Burlington.....		
4946	July 8, 1890	As assistant.	Sioux City.....		
4947	July 0, 1890	As assistant.	Edgewood.....		
4948	Dec. 24, 1890	As assistant.	Burlington.....		
4949	July 21, 1891	As assistant.	Tama City.....		
4950	Aug. 18, 1891	As assistant.	Lacoma.....	Tracy.....	April 17, 1892
4951	Nov. 12, 1891	As assistant.	Maquoketa.....	North English.....	April 29, 1892
4952	Mar. 6, 1892	As assistant.	Maquoketa.....	Newell.....	Nov. 20, 1892
4953	May 20, 1892	As assistant.	Clarion.....	Dows.....	May 27, 1892
4954	Dec. 27, 1892	As assistant.	Dubuque.....	Maquoketa.....	Oct. 14, 1892
4955	April 17, 1894	As assistant.	Lansing.....		
4956	June 2, 1894	As assistant.	Oskaloosa.....		
4957	Aug. 15, 1895	As assistant.	Shelfield.....		
4958	May 18, 1896	As assistant.	Oskaloosa.....		
4959	Feb. 24, 1897	As assistant.	Des Moines.....		
4960	April 5, 1897	As assistant.	Shelfield.....	Eagle Grove.....	May 4, 1898
4961	Sept. 4, 1897	As assistant.	Winterest.....		
4962	Mar. 4, 1899	As assistant.	Center Point.....		

In Illinois.

Out of business.

Out of business.

ABSTRACT—CONTINUED.

NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LAST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
Nordstrom, S. G.	Sept. 3, 1899	By examination.	Dayton.	Stour Rapids.	Jan. 10, 1901	
3761	Nov. 25, 1899		Dayton.	Adley.	Oct. 12, 1901	
3771	Feb. 10, 1900		Iowa City.			
3805	Feb. 27, 1900		Burlington.			
3808	July 1, 1900		Stour Rapids.	Dayton.	May 7, 1905	
3804	Sept. 1, 1900		Stanton.	Essex.	Nov. 16, 1901	Out of business.
3825	Sept. 12, 1900		Des Moines.			
3840	Oct. 15, 1900		Davenport.			
3904	Mar. 8, 1901		Waterloo.	Charles City.	Feb. 9, 1904	
4002	Mar. 8, 1901		Woodward.			
4054	June 23, 1901		Des Moines.			
4121	July 7, 1901		Spencer.	Independence.	Oct. 24, 1902	
4344	Oct. 4, 1901		Des Moines.	Wellman.	Jan. 24, 1903	
4344	Dec. 13, 1902		Merrill.			
4413	Mar. 8, 1903		Oregon.			
4475	June 7, 1903		Adley.	Hubbard.	Feb. 27, 1909	Concordia, Kan.
4516	Sept. 25, 1903		Stour City.			
4559	Nov. 25, 1903		Britt.			
4608	Mar. 18, 1904		Bedford.	Corwith.	July 15, 1905	
4734	July 8, 1904		Humboldt.	Forest City.	Mar. 24, 1906	
4775	Sept. 4, 1904		Marshalltown.	St Anthony.	Sept. 4, 1906	
4818	Nov. 12, 1904		Panora.			
4919	Aug. 9, 1905		Presco.	Hawkeye.	Dec. 20, 1901	
4969	Dec. 10, 1905		Marathon.	Fonda.	Mar. 23, 1902	
5000	April 21, 1906		Ruthven.	Charles City.	Mar. 11, 1904	
5000	May 1, 1906		Danbury.			
5020	June 2, 1906		Webster City.	Kingsley.	Nov. 5, 1906	
5150	Aug. 4, 1906		Stanwood.			
5156	Oct. 23, 1906		Alburnetia.			
5243	Dec. 7, 1907		Iowa City.			
5285	Mar. 1, 1909		Oreston.			
5481	Mar. 21, 1909		Blanchard.	Mt. Union.	Aug. 20, 1909	
5513	July 27, 1909		Des Moines.			
5625	Feb. 7, 1909		Ottumwa.	Ames.	July 22, 1909	
5648	Mar. 7, 1909		Ottumwa.	Des Moines.	April 21, 1909	
5717	April 29, 1909		Scale Center.			
5718	Aug. 1, 1909		Pella.	Monroe.	Aug. 9, 1909	

5196	Oct. 22, 1896	Graduate.	Albionette.	Hartwick	-----, 1896	
374	June 10, 1890	As owner	Olinion.			
420	June 12, 1890	As assistant.	Des Moines.			
861	June 8, 1890	As assistant.	Maquoketa.			
961	June 11, 1890	As owner	New Hampton.			
971	July 5, 1890	As owner	Melrose.			
1118	July 7, 1890	As owner	Chelise.			
1264	June 7, 1890	As assistant	Tabor.			
1442	July 15, 1890	As	Ripley.			
1590	Dec. 12, 1890	By	Fort Dodge.			
2223	Oct. 4, 1890	By	Oskaloosa.			
2291	Oct. 3, 1891	By	Farley.			
2306	Nov. 26, 1891	By examination.	Alton.	Scranton.	Jan. 31, 1890	Lathrop, Mo.
2348	Dec. 17, 1891	By examination.	Riverton	Missouri Valley...	Jan. 21, 1897	Out of business.
2658	April 7, 1893	By examination.	Keokuk.			
3027	June 15, 1896	By examination.	Marion.			
3107	Dec. 17, 1896	By examination.	Des Moines.			Out of business.
3476	June 16, 1898	By examination.	Scranton.			
3199	July 11, 1898	By examination.	Des Moines.			
3265	Jan. 20, 1899	By examination.	Lime Springs.			
3240	Feb. 12, 1899	By examination.				
3287	Feb. 6, 1899	By examination.				
3490	July 12, 1899	Graduate		St. Pleasant	Mar. 23, 1894	In Minnesota
3606	Nov. 2, 1899	By examination.				
4059	Mar. 20, 1899	By examination.		Indianola.	Feb. 1, 1895	
4223	Feb. 1, 1898	By examination.				
4343	Dec. 6, 1898	By examination.		Geneva.	Mar. 25, 1899	In Texas.
4443	May 2, 1898	By examination.				
4467	June 6, 1898	By examination.				
4496	July 11, 1898	By examination.		Sherfield	Sept. 26, 1894	In Missouri.
4638	July 26, 1897	By examination.				
4646	April 4, 1898	By examination.				
4614	Feb. 6, 1895	By examination.				
4878	Mar. 23, 1894	By examination.				
4907	May 7, 1895	By examination.				
4918	July 16, 1895	By examination.				
4970	Aug. 6, 1896	By examination.				
5009	Jan. 7, 1896	By				
5004	Mar. 2, 1894	By				
5003	April 17, 1896	As				
5004	April 21, 1896	By		Aplington	Jan. 6, 1897	In South Dakota.
5164	June 2, 1896	By		Elliot.	Sept. 20, 1897	
5208	Jan. 6, 1897	By		Corinth	May 24, 1896	
5295	May 1, 1897	By		Oedar Falls	Mar. 9, 1896	
5409	Feb. 1, 1898	By		Kidon	Oct. 24, 1896	
5423	Mar. 1, 1898	By				
5505	Sept. 7, 1898	As				
5578	Oct. 4, 1898	As		Oakland	Nov. 9, 1898	

ANNUAL—CONTINUED.

Number of Cert.	NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
5787	O'Connor T G	Aug. 1, 1899	By examination.	Maloy.			
5789		Aug. 1, 1899	By examination.	Des Moines.			
58		June 2, 1899	As owner.	Bristow.			
123		June 2, 1899	As owner.	Floyd.			
431		June 15, 1899	As owner.	Pt. Madison.			
637		June 2, 1899	As owner.	Des Moines.			
729		June 2, 1899	As owner.	Griswold.			
822		June 2, 1899	As principal.	Brooks.			
827		June 2, 1899	As owner.	McGregor.			
835		June 1, 1899	As assistant.	Mt. Pleasant.			
844		June 2, 1899	As owner.	McGregor.			
852		June 9, 1899	As assistant.	Monticello.			
855		June 9, 1899	As owner.	Newton.			
862		July 9, 1899	As assistant.	Marshalltown.			
1161		June 2, 1899	As owner.	Sibley.			
1200		June 2, 1899	As assistant.	Viator.			
1202		June 4, 1899	As principal.	West Liberty.			Out of business.
1209		June 4, 1899	As owner.	Burlington.			
1228		July 24, 1899	As owner.	Dubuque.			
1236		Aug. 6, 1899	As owner.	Brooks.			
1247		Sept. 7, 1899	As assistant.	Charles City.	McIntyre.	July 12, 1900	
1248		Nov. 29, 1899	By examination.	Wapello.	Stratford.	Aug. 12, 1900	
1265		July 24, 1899	By examination.	Des Moines.			
1309		July 20, 1899	As assistant.	Kirkville.			
1344		Jan. 20, 1900	By examination.	Blairtown.			
1354		June 20, 1899	By examination.	Davenport.			
1367		Oct. 12, 1899	By examination.	Richland.			
1368		Dec. 12, 1899	By examination.	Petersen.			
1370		Feb. 27, 1900	By examination.	Pocahontas Center.	Sutherland.	May 25, 1900	
1380		April 27, 1900	By examination.	Van Grove.			
1385		May 22, 1900	By examination.	Moravia.			
1391		Sept. 5, 1900	By examination.	Gresco.	Monkton.	Jan. 15, 1901	
1393		Dec. 1, 1900	By examination.	Mason.			
1394		Mar. 2, 1901	By examination.	Hurlan.	Eagle Grove.	Nov. 14, 1900	
1395		Sept. 6, 1900	By examination.	Muscatine.			
1397		April 9, 1901	By examination.	Lewis.	Williamaburg.	Aug. 15, 1900	
1398		May 25, 1901	By examination.	Lewis.	Oskaloosa.	Jan. 1, 1900	
1399		May 25, 1901	By examination.	Lewis.	Lewis.		
1400		May 25, 1901	By examination.	Lewis.	Lewis.		
1401		May 25, 1901	By examination.	Lewis.	Lewis.		
1402		May 25, 1901	By examination.	Lewis.	Lewis.		
1403		May 25, 1901	By examination.	Lewis.	Lewis.		
1404		May 25, 1901	By examination.	Lewis.	Lewis.		
1405		May 25, 1901	By examination.	Lewis.	Lewis.		
1406		May 25, 1901	By examination.	Lewis.	Lewis.		
1407		May 25, 1901	By examination.	Lewis.	Lewis.		
1408		May 25, 1901	By examination.	Lewis.	Lewis.		
1409		May 25, 1901	By examination.	Lewis.	Lewis.		
1410		May 25, 1901	By examination.	Lewis.	Lewis.		
1411		May 25, 1901	By examination.	Lewis.	Lewis.		
1412		May 25, 1901	By examination.	Lewis.	Lewis.		
1413		May 25, 1901	By examination.	Lewis.	Lewis.		
1414		May 25, 1901	By examination.	Lewis.	Lewis.		
1415		May 25, 1901	By examination.	Lewis.	Lewis.		
1416		May 25, 1901	By examination.	Lewis.	Lewis.		
1417		May 25, 1901	By examination.	Lewis.	Lewis.		
1418		May 25, 1901	By examination.	Lewis.	Lewis.		
1419		May 25, 1901	By examination.	Lewis.	Lewis.		
1420		May 25, 1901	By examination.	Lewis.	Lewis.		
1421		May 25, 1901	By examination.	Lewis.	Lewis.		
1422		May 25, 1901	By examination.	Lewis.	Lewis.		
1423		May 25, 1901	By examination.	Lewis.	Lewis.		
1424		May 25, 1901	By examination.	Lewis.	Lewis.		
1425		May 25, 1901	By examination.	Lewis.	Lewis.		
1426		May 25, 1901	By examination.	Lewis.	Lewis.		
1427		May 25, 1901	By examination.	Lewis.	Lewis.		
1428		May 25, 1901	By examination.	Lewis.	Lewis.		
1429		May 25, 1901	By examination.	Lewis.	Lewis.		
1430		May 25, 1901	By examination.	Lewis.	Lewis.		
1431		May 25, 1901	By examination.	Lewis.	Lewis.		
1432		May 25, 1901	By examination.	Lewis.	Lewis.		
1433		May 25, 1901	By examination.	Lewis.	Lewis.		
1434		May 25, 1901	By examination.	Lewis.	Lewis.		
1435		May 25, 1901	By examination.	Lewis.	Lewis.		
1436		May 25, 1901	By examination.	Lewis.	Lewis.		
1437		May 25, 1901	By examination.	Lewis.	Lewis.		
1438		May 25, 1901	By examination.	Lewis.	Lewis.		
1439		May 25, 1901	By examination.	Lewis.	Lewis.		
1440		May 25, 1901	By examination.	Lewis.	Lewis.		
1441		May 25, 1901	By examination.	Lewis.	Lewis.		
1442		May 25, 1901	By examination.	Lewis.	Lewis.		
1443		May 25, 1901	By examination.	Lewis.	Lewis.		
1444		May 25, 1901	By examination.	Lewis.	Lewis.		
1445		May 25, 1901	By examination.	Lewis.	Lewis.		
1446		May 25, 1901	By examination.	Lewis.	Lewis.		
1447		May 25, 1901	By examination.	Lewis.	Lewis.		
1448		May 25, 1901	By examination.	Lewis.	Lewis.		
1449		May 25, 1901	By examination.	Lewis.	Lewis.		
1450		May 25, 1901	By examination.	Lewis.	Lewis.		
1451		May 25, 1901	By examination.	Lewis.	Lewis.		
1452		May 25, 1901	By examination.	Lewis.	Lewis.		
1453		May 25, 1901	By examination.	Lewis.	Lewis.		
1454		May 25, 1901	By examination.	Lewis.	Lewis.		
1455		May 25, 1901	By examination.	Lewis.	Lewis.		
1456		May 25, 1901	By examination.	Lewis.	Lewis.		
1457		May 25, 1901	By examination.	Lewis.	Lewis.		
1458		May 25, 1901	By examination.	Lewis.	Lewis.		
1459		May 25, 1901	By examination.	Lewis.	Lewis.		
1460		May 25, 1901	By examination.	Lewis.	Lewis.		
1461		May 25, 1901	By examination.	Lewis.	Lewis.		
1462		May 25, 1901	By examination.	Lewis.	Lewis.		
1463		May 25, 1901	By examination.	Lewis.	Lewis.		
1464		May 25, 1901	By examination.	Lewis.	Lewis.		
1465		May 25, 1901	By examination.	Lewis.	Lewis.		
1466		May 25, 1901	By examination.	Lewis.	Lewis.		
1467		May 25, 1901	By examination.	Lewis.	Lewis.		
1468		May 25, 1901	By examination.	Lewis.	Lewis.		
1469		May 25, 1901	By examination.	Lewis.	Lewis.		
1470		May 25, 1901	By examination.	Lewis.	Lewis.		
1471		May 25, 1901	By examination.	Lewis.	Lewis.		
1472		May 25, 1901	By examination.	Lewis.	Lewis.		
1473		May 25, 1901	By examination.	Lewis.	Lewis.		
1474		May 25, 1901	By examination.	Lewis.	Lewis.		
1475		May 25, 1901	By examination.	Lewis.	Lewis.		
1476		May 25, 1901	By examination.	Lewis.	Lewis.		
1477		May 25, 1901	By examination.	Lewis.	Lewis.		
1478		May 25, 1901	By examination.	Lewis.	Lewis.		
1479		May 25, 1901	By examination.	Lewis.	Lewis.		
1480		May 25, 1901	By examination.	Lewis.	Lewis.		
1481		May 25, 1901	By examination.	Lewis.	Lewis.		
1482		May 25, 1901	By examination.	Lewis.	Lewis.		
1483		May 25, 1901	By examination.	Lewis.	Lewis.		
1484		May 25, 1901	By examination.	Lewis.	Lewis.		
1485		May 25, 1901	By examination.	Lewis.	Lewis.		
1486		May 25, 1901	By examination.	Lewis.	Lewis.		
1487		May 25, 1901	By examination.	Lewis.	Lewis.		
1488		May 25, 1901	By examination.	Lewis.	Lewis.		
1489		May 25, 1901	By examination.	Lewis.	Lewis.		
1490		May 25, 1901	By examination.	Lewis.	Lewis.		
1491		May 25, 1901	By examination.	Lewis.	Lewis.		
1492		May 25, 1901	By examination.	Lewis.	Lewis.		
1493		May 25, 1901	By examination.	Lewis.	Lewis.		
1494		May 25, 1901	By examination.	Lewis.	Lewis.		
1495		May 25, 1901	By examination.	Lewis.	Lewis.		
1496		May 25, 1901	By examination.	Lewis.	Lewis.		
1497		May 25, 1901	By examination.	Lewis.	Lewis.		
1498		May 25, 1901	By examination.	Lewis.	Lewis.		
1499		May 25, 1901	By examination.	Lewis.	Lewis.		
1500		May 25, 1901	By examination.	Lewis.	Lewis.		

2335	Pember, H. E.....	Feb. 2, 1895	By examination.....	Spencer.....	Rock Valley.....	May 12, 1895
2315	.....	Sept. 1, 1895	By examination.....	Elverton.....	Shenandoah.....	Feb. 5, 1895
2340	.....	Sept. 4, 1895	By examination.....	Oakdale.....	.....	.....
2343	.....	Nov. 11, 1895	By examination.....	Red Oak.....	.....	.....
2395	.....	June 15, 1895	By examination.....	Nora Springs.....	.....	.....
2124	.....	Mar. 25, 1897	By examination.....	What Cheer.....	Mapleton.....	May 27, 1897
2164	.....	Feb. 23, 1897	By examination.....	Ida Grove.....	.....	.....
2187	.....	Feb. 18, 1897	By examination.....	Dubuque.....	.....	.....
2207	.....	June 7, 1897	By examination.....	Gladsbrook.....	.....	.....
2297	.....	Aug. 17, 1897	By examination.....	Paulina.....	Blairtown.....	June 2, 1891
2306	.....	Oct. 17, 1897	By examination.....	Le Mars.....	Cedar Falls.....	Oct. 1, 1899
2325	.....	Aug. 17, 1897	By examination.....	Forest City.....	.....	.....
2328	.....	Oct. 6, 1898	By examination.....	Eldora.....	Strawberry Point.....	June 17, 1895
2429	.....	Mar. 20, 1898	By examination.....	Parkersburg.....	.....	.....
2438	.....	May 1, 1898	By examination.....	Shambaugh.....	.....	.....
2499	.....	Aug. 7, 1898	By examination.....	Waukon.....	Corning.....	Dec. 2, 1891
2504	.....	Feb. 7, 1899	By examination.....	Sloan.....	.....	.....
2576	.....	Mar. 27, 1899	By examination.....	West Union.....	.....	.....
2694	.....	June 11, 1899	By examination.....	Olin.....	(Ola only).	.....
2720	.....	July 8, 1899	By examination.....	Yail.....	Pauline.....	May 13, 1895
2734	.....	Sept. 4, 1899	By examination.....	Unionville.....	Garden Grove.....	April 21, 1897
2805	.....	April 1, 1900	By examination.....	Woodward.....	.....	.....
2807	.....	April 22, 1900	By examination.....	Carroll.....	Fonda.....	March 1, 1894
2895	.....	July 25, 1900	By examination.....	Cedar Falls.....	Parkersburg.....	Oct. 1, 1891
2914	.....	Sept. 11, 1900	By examination.....	Britt.....	Bloomfield.....	April 7, 1899
2934	.....	Nov. 5, 1900	By examination.....	Grinnell.....	.....	.....
2967	.....	Mar. 21, 1901	By examination.....	Cedar Rapids.....	.....	.....
3020	.....	May 7, 1901	By examination.....	Cedar Rapids.....	Atlantic.....	Sept. 14, 1891
4051	.....	June 2, 1901	By examination.....	Adair.....	.....	.....
4069	.....	June 2, 1901	By examination.....	Tracy.....	Elkosa.....	Feb. 14, 1894
4071	.....	June 19, 1901	By examination.....	Des Moines.....	.....	.....
4083	.....	Aug. 4, 1901	By examination.....	Spencer.....	.....	.....
4180	.....	Sept. 20, 1901	By examination.....	Fredericksburg.....	.....	.....
4151	.....	Dec. 1, 1901	By examination.....	Ackley.....	Oakville.....	May 13, 1897
4142	.....	Dec. 1, 1901	By examination.....	Martinsburg.....	.....	.....
4205	.....	Feb. 6, 1902	By examination.....	Ottumwa.....	.....	.....
4261	.....	July 5, 1902	By examination.....	Odebolt.....	.....	.....
4279	.....	July 20, 1902	By examination.....	Bonaparte.....	.....	.....
4284	.....	Nov. 23, 1902	By examination.....	Winterset.....	.....	.....
4245	.....	Dec. 13, 1902	By examination.....	Russells.....	.....	.....
4283	.....	Feb. 15, 1903	By examination.....	Des Moines.....	Dallas Center.....	Nov. 24, 1905
4381	.....	Feb. 21, 1903	By examination.....	Independence.....	.....	.....
4396	.....	Feb. 23, 1903	By examination.....	Akron.....	Ireton.....	Dec. 15, 1891
4491	.....	July 1, 1903	By examination.....	Montezuma.....	.....	.....
4508	.....	Sept. 6, 1903	By examination.....	Colu.....	Galmar.....	Aug. 2, 1897
4512	.....	Sept. 5, 1903	By examination.....	Cedar Falls.....	.....	.....
4532	.....	Nov. 9, 1903	By examination.....	Sibley.....	Des Moines.....	June 15, 1905
4535	.....	.....	By examination.....	Atlantic.....	.....	.....

Out of business.

Out of business.

Out of business.

Out of business.

Out of business.

ABSTRACT—CONTINUED.

Number of Cert.	NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
4602	Power, J. H.	Mar. 6, 1894	By examination.	Bloomfield.	Cincinnati.	July 26, 1894	
4605		April 17, 1894		Montezuma.	Hawarden.	May 9, 1898	
4618		April 30, 1894		Moulton.	Milton.	Aug. 14, 1899	
4653	O.	May 1, 1894		Odebolt.	Marshalltown.	Feb. 2, 1897	
4653		June 26, 1894		Kingsley.	Alvord.	Oct. 15, 1898	
4691		July 2, 1894		Freton.			
4693		July 14, 1894		Hawarden.			
4698		July 9, 1894		Wesley.	Buffalo Center.	June 24, 1898	
4712		Sept. 25, 1894		Dubuque.			
4760		Oct. 8, 1894		Hawarden.	Kanawha.	Aug. 9, 1899	
4834		April 2, 1894		Siem.	Stanbope.	Nov. 21, 1899	
4832		Mar. 23, 1895		Goldfield.	Marwell.	Oct. 21, 1898	
4923		Mar. 6, 1895		Hasterton City.	Boone.	June 5, 1897	
4976	Pond, A. M.	Aug. 6, 1895		Webster City.			
4993	Perry, T. J.	Jan. 7, 1898		Williamsburg.	Pioneer.	May 15, 1897	
5046	Preble, O. H.	Feb. 4, 1898		Humboldt.			
5088	Petersmeyer, E. O.	April 7, 1898		Odebolt.			
5097	Penney, T. A.	May 5, 1898		Logan.			
5125	Parr, F. W.	June 2, 1898		Wall Lake.			
5217		Sept. 1, 1898		Greco.	Goldfield.	Sept. 2, 1898	
5229		Mar. 2, 1897		Dexter.	Stuart.	Sept. 22, 1897	
5240		Mar. 9, 1897		Cedar Falls.	Oelwein.	July 10, 1898	
5241		April 6, 1897		Harlan.			
5252		April 6, 1897		Earville.	Manchester.	July 10, 1898	
5253		April 6, 1897		Fairfield.			
5294		July 2, 1897		Dayton.	Lehigh.	Nov. 4, 1897	
5314		Aug. 2, 1897		Webster City.			
5329		Sept. 7, 1897		Gowrie.			
5417		Mar. 1, 1893		Paton.			
5417		Mar. 1, 1898		Sween City.			
5424	W.	Mar. 1, 1898		Clarinda.			
5454		Mar. 15, 1898		Fertile.			
5458		Mar. 21, 1898		Monticello.	Calmar.	April 21, 1899	
5488		Mar. 21, 1898		Wilcox Junction.			
5489	la.	July 7, 1898		Forest City.			
5509		July 7, 1898		Dubuque.			
5544		Aug. 2, 1898		Marwell.	Des Moines.	July 27, 1899	

5851	Prest, P. H.	Aug.	1899	Hastings	Emerson	Feb. 9, 1899	
5852	Pickarill, J. E.	Sept.	1899	Des Moines			
5853	Porter, G. E.	Oct.	1899	Des Moines			
5857	Petree, J. E.	Oct.	1899	Gladbrook	Le Mars	Feb. 12, 1899	
5858		Dec.	1899	Bridgewater			
5859		April	1899	Westfield			
5860		July	1899	Des Moines			
5861		Aug.	1899	Des Moines			
5862		Aug.	1899	Belle Plaine			
5863		Aug.	1899	Lynnville			
5864		July	1899	Wynaville			
5865		Dec.	1899	Windsor	Searsboro	Dec. 22, 1899	Out of business
5866		Mar.	1899	Harvard			
5867		Oct.	1899	Chariton	Mariden	Aug. 12, 1899	
5868		Dec.	1899	Edgeway	Swaledale	Mar. 1, 1899	
5869		Oct.	1899	Whiting			
5870		June	1899	West Point			
5871		June	1899	Clarksville			
5872		June	1899	Paraguy			
5873		June	1899	Agassiz City			
5874		June	1899	Des Moines			
5875		June	1899	Bellevue			
5876		June	1899	Audubon			
5877		June	1899	Harlington			
5878		June	1899	Birmingham			
5879		June	1899	Gorham			
5880		June	1899	Des Moines			
5881		June	1899	Dallas Center			
5882		June	1899	Davis City			
5883		June	1899	Dubuque			
5884		June	1899	Monterona	Albia	Feb. 17, 1899	
5885		June	1899	Keokuk	Des Moines	May 12, 1899	
5886		June	1899	As assistant			
5887		June	1899	As owner			
5888		June	1899	As owner			
5889		June	1899	As owner			
5890		June	1899	As owner			
5891		June	1899	As owner			
5892		June	1899	As owner			
5893		June	1899	As owner			
5894		June	1899	As owner			
5895		June	1899	As owner			
5896		June	1899	As owner			
5897		June	1899	As owner			
5898		June	1899	As owner			
5899		June	1899	As owner			
5900		June	1899	As owner			
5901		June	1899	As owner			
5902		June	1899	As owner			
5903		June	1899	As owner			
5904		June	1899	As owner			
5905		June	1899	As owner			
5906		June	1899	As owner			
5907		June	1899	As owner			
5908		June	1899	As owner			
5909		June	1899	As owner			
5910		June	1899	As owner			
5911		June	1899	As owner			
5912		June	1899	As owner			
5913		June	1899	As owner			
5914		June	1899	As owner			
5915		June	1899	As owner			
5916		June	1899	As owner			
5917		June	1899	As owner			
5918		June	1899	As owner			
5919		June	1899	As owner			
5920		June	1899	As owner			
5921		June	1899	As owner			
5922		June	1899	As owner			
5923		June	1899	As owner			
5924		June	1899	As owner			
5925		June	1899	As owner			
5926		June	1899	As owner			
5927		June	1899	As owner			
5928		June	1899	As owner			
5929		June	1899	As owner			
5930		June	1899	As owner			
5931		June	1899	As owner			
5932		June	1899	As owner			
5933		June	1899	As owner			
5934		June	1899	As owner			
5935		June	1899	As owner			
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ABSTRACT—CONTINUED.

Number of Certificates	NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
3066	Reel, A. E.	April 6, 1891	By examination.	Des Moines.	Oskaloosa.	May 19, 1897	In Minnesota.
3105	Rice, Charles W.	July 11, 1891	.....	Cantril.	.....	.....	.....
3106	Ray, B. G.	Dec. 20, 1891	.....	Charlottesville.	Nashua.	April 12, 1894	.....
3200	Richardson, G. A.	Feb. 3, 1893	.....	Blairtown.	Denison.	Jan. 21, 1894	Out of business.
3207	Elley, F. M.	Feb. 6, 1893	.....	Jefferson.	Des Moines.	Sept. 23, 1896	.....
3255	Randall, Charles T.	Feb. 24, 1893	.....	Dunlap.	.....	.....	.....
3260	Ryan, J. E.	Mar. 27, 1893	.....	Coiflar.	.....	.....	.....
3267	Bookwell, R. B.	April 4, 1893	.....	Bedford.	.....	.....	.....
3303	Robertson, J. C.	June 8, 1893	.....	Dublin.	Council Bluffs.	Sept. 7, 1897	Out of business.
3343	.....	Sept. 14, 1893	.....	Waukon.	Coln.	Jan. 14, 1898	.....
3546	.....	Oct. 19, 1893	.....	Mt. Pleasant.	Burlington.	April 14, 1898	.....
3568	.....	Oct. 25, 1893	.....	.....	.....	.....	.....
3598	.....	Mar. 20, 1893	.....	Harper.	Malvern.	Feb. 20, 1895	.....
3707	.....	Dec. 12, 1893	.....	Oakland.	.....	.....	.....
3723	.....	April 1, 1894	.....	Burlington.	.....	.....	.....
3741	.....	April 15, 1894	.....	Nevoirville.	Chataworth.	Dec. 10, 1899	.....
3766	.....	Sept. 2, 1894	.....	Conrad.	.....	.....	.....
3770	.....	Mar. 2, 1895	.....	Des Moines.	.....	.....	.....
3804	.....	May 6, 1895	.....	Milton.	Council Bluffs.	Jan. 9, 1900	.....
3820	.....	Sept. 14, 1895	.....	Bayard.	.....	.....	.....
3829	.....	Oct. 1, 1895	.....	Debuque.	Cedar Rapids.	Oct. 2, 1895	Out of business.
3851	.....	Dec. 1, 1895	.....	Koota.	.....	.....	In Nebraska
3859	.....	June 1, 1896	.....	Cass.	.....	.....	Out of business.
3863	.....	Feb. 1, 1897	.....	Panora.	.....	.....	.....
3912	.....	April 20, 1897	.....	Steamboat Rock.	Woodbine.	Oct. 19, 1897	.....
3924	.....	Dec. 21, 1897	.....	Dunlap.	Winthrop.	July 1, 1897	.....
3967	.....	May 17, 1897	.....	Brooklyn.	.....	.....	.....
3975	.....	May 17, 1897	.....	Wrona.	.....	.....	.....
3993	.....	June 7, 1897	.....	Ute.	Charter Oak.	Oct. 10, 1898	.....
3994	.....	Oct. 1, 1897	.....	Parkersburg.	Bannella.	Oct. 4, 1899	.....
3998	.....	Aug. 2, 1897	.....	Florida.	.....	.....	.....
3999	.....	Oct. 4, 1897	.....	Waukon.	West Union.	Nov. 1, 1895	.....
3999	.....	Oct. 14, 1897	.....	Des Moines.	Hambury.	Nov. 18, 1897	.....
3999	.....	Nov. 1, 1897	.....	Analisa.	Prarie City.	Dec. 15, 1897	.....
3999	.....	Sept. 18, 1899	.....	Davenport.	.....	.....	In Illinois.
3999	.....	Oct. 1, 1899	.....	Des Moines.	.....	.....	.....
3999	.....	Dec. 14, 1899	.....	Early.	.....	.....	.....

2870	Jan. 14, 1898	Tipson.	Clear Lake.	Sept. 20, 1898
2886	Feb. 7, 1898	Sibley.	Minabara.	Jan. 10, 1898
2919	Mar. 1, 1898	Corringtonville.	Le Mass.	May 8, 1898
2921	July 16, 1898	Riceville.		
2970	Aug. 6, 1898	Sioux City.		
2971	Nov. 19, 1898	Humboldt.		
2977	Dec. 2, 1898	Cantril.		
2990	Jan. 18, 1899	Vall.		
2991	Feb. 24, 1891	Mt. Pleasant.		
2992	Feb. 25, 1899	Woodbine.	Portsmouth.	Oct. 1, 1898
2993	April 1, 1899	Iowa City.		
2994	April 22, 1899	Independence.		
2995	July 14, 1899	Grinnell.		
2996	Dec. 2, 1899	Panora.	Richland.	Sept. 26, 1897
2997	Feb. 8, 1891	Sigourney.		
2998	Feb. 11, 1891	Payette.		
2999	Mar. 3, 1891	Sioux City.		
3000	Mar. 7, 1891	Griswold.		
4007	April 7, 1891	Algona.	Rockwell City.	Sept. 15, 1891
4008	June 26, 1891	Mitchellville.	Britt.	May 14, 1891
4009	Aug. 4, 1891	Cushing.	Des Moines.	May 13, 1893
4010	Sept. 1, 1891	Greeley.	Washita.	Oct. 6, 1891
4011	Sept. 23, 1891	Keosauqua.	Edgewood.	Mar. 20, 1896
4012	Jan. 7, 1892	West Point.		
4119	Feb. 16, 1892	Garrison.		
4181	Mar. 11, 1892	Dubuque.		
4302	May 6, 1892	Rockwell.		
4305	May 24, 1892	Scranton.	Ohurda.	Feb. 2, 1892
4314	June 7, 1892	Indianola.	Lacona.	Feb. 25, 1894
4315	July 1, 1892	Ferguson.	Union.	Dec. 28, 1893
4316	July 6, 1892	Ottumwa.		
4370	Oct. 25, 1892	Neola.	Clarinda.	Nov. 12, 1893
4386	Dec. 6, 1892	New Market.		
4390	Dec. 20, 1892	Des Moines.		
4391	Jan. 21, 1893	Stuart.		
4392	Mar. 7, 1893	Lake Park.		
4407	Mar. 7, 1893	Diagonal.		
4408	Mar. 7, 1893	Ottumwa.		
4445	May 2, 1893	Des Moines.	Neola.	May 21, 1893
4457	July 5, 1893	Gladbrook.	Laurens.	Nov. 11, 1897
4500	Dec. 6, 1893	Des Moines.		
4578	Feb. 6, 1894	Tama.	Cedar Rapids.	July 25, 1894
4593	Mar. 6, 1894	Glenwood.		
4594	Mar. 6, 1894	Lime Springs.		
4680	June 6, 1894	Brooklyn.		
4700	Aug. 6, 1894	Clinton.		
4721	Sept. 4, 1894	Keokuk.	Wassata.	Jan. 24, 1895
4722	Sept. 4, 1894	Sumner.	Long Tree.	Nov. 24, 1895
4723	Sept. 4, 1894	Tipson.		
4724	Sept. 12, 1894	Columbus Junction.		

In Nebraska.

ABSTRACT—CONTINUED.

Number of certificate.	NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
4755	Reynolds, John W.	Sept. 5, 1893	By examination.	Greerton.			
4773	Ross, N. E.	Nov. 13, 1894	By examination.	Victor			
4800	Russell, Fred.	Jan. 14, 1895	By examination.	Lake City.			
4802	Ripley, J. E.	Jan. 23, 1895	By examination.	Pierson.	Kingsley.	Mar. 16, 1899	
4822		May 7, 1895	By examination.	Lohrville.			
4841		May 7, 1895	By examination.	Lian Grove.			
4917		Aug. 9, 1895	By examination.	Waukon.	Nashua.	April 2, 1896	
4928		Sept. 10, 1895	By examination.	Prairie City.			
4977		Jan. 7, 1896	By examination.	Henderson.	Pacific Junction.	Mar. 28, 1898	
5041		Mar. 8, 1896	By examination.	South English.	Tipton.	May 9, 1899	
5043		April 7, 1896	By examination.	Mt. Pleasant.			
5057		May 5, 1896	By examination.	Clearfield.			
5069		June 2, 1896	By examination.	Des Moines.	Murray.	Oct. 11, 1896	
5219		Feb. 2, 1897	By examination.	Waterloo.			
5220		Mar. 2, 1897	By examination.	Dubuque.			
5222		Mar. 2, 1897	By examination.	Kecauqua.			
5225		Mar. 2, 1897	By examination.	Clear Lake.			
5228		Mar. 2, 1897	By examination.	Leon.			
5231		April 6, 1897	By examination.	Elkader.	Stratford.	Sept. 22, 1899	
5234		April 6, 1897	By examination.	Waterloo.			
5239		May 4, 1897	By examination.	Hampton.	Ocon Rapids.	Aug. 29, 1897	
5271		May 4, 1897	By examination.	Grinnell.			
5273		May 4, 1897	By examination.	Oscar Rapids.			
5301		Aug. 2, 1897	Graduate.	Odebolt.	Grundy Center.	April 5, 1899	
5357		Nov. 2, 1897	By examination.	Dyersville.			
5364		Dec. 7, 1897	By examination.	Pringhar.			
5369		Dec. 7, 1897	By examination.	Bedford.			
5384		Mar. 1, 1899	By examination.	Northwood.			
5385		Mar. 1, 1899	By examination.	Des Moines.			
5443		April 5, 1899	By examination.	Dana.			
5445		April 5, 1899	By examination.	Eldon.			
5462		April 5, 1899	By examination.	Montezuma.			
5478	How, J. A.	April 5, 1899	By examination.	Marathon.		Jan. 7, 1900	
5479	Robinson, O. W.	April 5, 1899	By examination.	Davis City.	Ottumwa.	July 12, 1900	
5490	Moore, W. H.	April 5, 1899	By examination.	Bloomville.			
5506	Wood, O. T.	June 7, 1899	By examination.	Portsmouth.			
5508	Wuegnitz, B. A.	Aug. 2, 1899	By examination.	Dubuque.			

COMMISSIONERS OF PHARMACY.

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1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460	2461	2462	2463	2464	2465	2466	2467	2468	2469	2470	2471	2472	2473	2474	2475	2476	2477	2478	2479	2480	2481	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493	2494	2495	2496	2497	2498	2499	2500	2501	2502	2503	2504	2505	2506	2507	2508	2509	2510	2511	2512	2513	2514	2515	2516	2517	2518	2519	2520	2521	2522	2523	2524	2525	2526	2527	2528	2529	2530	2531	2532	2533	2534	2535	2536	2537	2538	2539	2540	2541	2542	2543	2544	2545	2546	2547	2548	2549	2550	2551	2552	2553	2554	2555	2556	2557	2558	2559	2560	2561	2562	2563	2564	2565	2566	2567	2568	2569	2570	2571	2572	2573	2574	2575	2576	2577	2578	2579	2580	2581	2582	2583	2584	2585	2586	2587	2588	2589	2590	2591	2592	2593	2594	2595	2596	2597	2598	2599	2600	2601	2602	2603	2604	2605	2606	2607	2608	2609	2610	2611	2612	2613	2614	2615	2616	2617	2618	2619	2620	2621	2622	2623	2624	2625	2626	2627	2628	2629	2630	2631	2632	2633	2634	2635	2636	2637	2638	2639	2640	2641	2642	2643	2644	2645	2646	2647	2648	2649	2650	2651	2652	2653	2654	2655	2656	2657	2658	2659	2660	2661	2662	2663	2664	2665	2666	2667	2668	2669	2670	2671	2672	2673	2674	2675	2676	2677	2678	2679	2680	2681	2682	2683	2684	2685	2686	2687	2688	2689	2690	2691	2692	2693	2694	2695	2696	2697	2698	2699	2700	2701	2702	2703	2704	2705	2706	2707	2708	2709	2710	2711	2712	2713	2714	2715	2716	2717	2718	2719	2720	2721	2722	2723	2724	2725	2726	2727	2728	2729	2730	2731	2732	2733	2734	2735	2736	2737	2738	2739	2740	2741	2742	2743	2744	2745	2746	2747	2748	2749	2750	2751	2752	2753	2754	2755	2756	2757	2758	2759	2760	2761	2762	2763	2764	2765	2766	2767	2768	2769	2770	2771	2772	2773	2774	2775	2776	2777	2778	2779	2780	2781	2782	2783	2784	2785	2786	2787	2788	2789	2790	2791	2792	2793	2794	2795	2796	2797	2798	2799	2800	2801	2802	2803	2804	2805	2806	2807	2808	2809	2810	2811	2812	2813	2814	2815	2816	2817	2818	2819	2820	2821	2822	2823	2824	2825	2826	2827	2828	2829	2830	2831	2832	2833	2834	2835	2836	2837	2838	2839	2840	2841	2842	2843	2844	2845	2846	2847	2848	2849	2850	2851	2852	2853	2854	2855	2856	2857	2858	2859	2860	2861	2862	2863	2864	2865	2866	2867	2868	2869	2870	2871	2872	2873	2874	2875	2876	2877	2878	2879	2880	2881	2882	2883	2884	2885	2886	2887	2888	2889	2890	2891	2892	2893	2894	2895	2896	2897	2898	2899	2900	2901	2902	2903	2904	2905	2906	2907	2908	2909	2910	2911	2912	2913	2914	2915	2916	2917	2918	2919	2920	2921	2922	2923	2924	2925	2926	2927	2928	2929	2930	2931	2932	2933	2934	2935	2936	2937	2938	2939	2940	2941	2942	2943	2944	2945	2946	2947	2948	2949	2950	2951	2952	2953	2954	2955	2956	2957	2958	2959	2960	2961	2962	2963	2964	2965	2966	2967	2968	2969	2970	2971	2972	2973	2974	2975	2976	2977	2978	2979	2980	2981	2982	2983	2984	2985	2986	2987	2988	2989	2990	2991	2992	2993	2994	2995	2996	2997	2998	2999	3000
Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											

ABSTRACT—CONTINUED.

1780	July 24, 1880	As owner	Ottumwa.
1787	Aug. 6, 1880	By examination.	Amara.
1805	Sept. 23, 1880	By examination.	Cedar Rapids.
1808	July 30, 1880	By	Vinton.
1808	Aug. 9, 1880	By	Centerville.
1828	Nov. 9, 1880	By	Griswold.
1840	Dec. 15, 1880	By	Fort Madison.
2015	Mar. 2, 1881	By	Altoona.
2204	Mar. 17, 1881	By	Hamburg.
2770	Jan. 10, 1881	By	Iowa Falls.
2727	May 22, 1881	By	Sigourney.
2129	June 23, 1881	By	Milo.
2140	May 24, 1881	By examination.	Carbon.
2143	May 27, 1881	By examination.	Arcadia.
2144	Aug. 12, 1881	By	Griswold.
2156	Aug. 11, 1881	By	Fairfield.
2177	Sept. 5, 1881	By	Carbon.
2289	Dec. 8, 1881	By	Burlington.
2308	Dec. 21, 1881	By	Gladibrook.
2381	Mar. 28, 1882	By examination.	Fort Dodge.
2406	April 1, 1882	By examination.	Sioux Rapids.
2419	April 27, 1882	By examination.	Bedford.
2477	May 10, 1882	By examination.	Clarinda.
2481	May 22, 1882	By examination.	Tingley.
2484	May 17, 1882	By examination.	Milo.
2487	May 18, 1882	By examination.	Lucas.
2488	May 24, 1882	By examination.	Arts.
2488	May 24, 1882	By examination.	Anamosa.
2490	May 24, 1882	By examination.	Shenandoah.
2504	June 12, 1882	By examination.	Corning.
2528	July 12, 1882	By examination.	Elgin.
2590	Oct. 10, 1882	By examination.	Hamburg.
2591	Mar. 20, 1883	By examination.	Scranton.
2613	Mar. 21, 1883	By examination.	Parkersburg.
2617	April 8, 1883	By examination.	Brooklyn.
2618	April 17, 1883	By examination.	Marshalltown.
2628	June 6, 1883	By examination.	Hedrick.

ABSTRACT—Continued.

Number of car.	NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
3423	Stoll, W. W.	April 2, 1898	By examination	Arcadia	Greenfield	Nov. 24, 1898	
3426	Sanford, H. Clay	April 10, 1898	By examination				In Washington.
3448	Schultz, Louis O.	April 17, 1898	By examination				
3453	Sandell, C. A.	May 23, 1898	By examination		Boone	Jan. 21, 1899	
3471	Shumway, W.	June 5, 1898	By examination				In Chicago.
3486		Sept. 5, 1898	By examination		Waterloo	April 18, 1899	
3534		Sept. 12, 1898	By examination				
3540		Oct. 4, 1898	By examination				
3553		Nov. 4, 1898	By examination		Council Bluffs	Aug. 15, 1899	
3564		Nov. 14, 1898	By examination				
3568		Dec. 4, 1898	By examination				
3577		Jan. 7, 1899	By examination		Havelock	Oct. 12, 1899	
3601		Feb. 19, 1899	By examination		Eagle Grove	Oct. 2, 1899	
3607		May 28, 1899	By examination		Winterset	Oct. 14, 1899	
3628		June 18, 1899	By examination				
3744		Oct. 1, 1899	By examination				
3755		Oct. 15, 1899	By examination				
3761		Oct. 20, 1899	By examination		Strawberry Point	Mar. 2, 1899	
3765		Nov. 9, 1899	By examination				
3766		Nov. 19, 1899	By examination		Colfax	Mar. 12, 1899	
3769		Dec. 20, 1899	By examination				
3785		Jan. 7, 1900	By examination				
3805		Jan. 28, 1900	By examination				
3815		Feb. 21, 1900	By examination				
3826		Feb. 27, 1900	By examination				
3838		April 1, 1900	By examination		Marshalltown	April 14, 1907	Out of business.
3871		May 8, 1900	By examination		Storm Lake	Feb. 16, 1901	
3890		June 9, 1900	By examination		Griswold	Jan. 1, 1905	
3895		July 12, 1900	By examination		Algona	Dec. 21, 1905	
3910		July 15, 1900	By examination		Casey	Feb. 12, 1908	
3927		Sept. 2, 1900	By examination				
3938		Sept. 2, 1900	By examination				
3952		Sept. 2, 1900	By examination		Laurel	Dec. 5, 1900	
3961		Nov. 25, 1900	By examination				
3966		Dec. 2, 1900	By examination		Claghorn	Jan. 20, 1905	
3967		Dec. 2, 1900	By examination		Des Moines	June 27, 1905	
3971		Jan. 19, 1901	By examination	Ames			Out of business.

COMMISSIONERS OF PHARMACY.

78

Month	Day	Location	Time
Feb.	14, 1891	Des Moines	Sept. 15, 1901
Mar.	7, 1891	Battle Creek	Feb. 8, 1902
Apr.	1, 1891	Marathon	
May	5, 1891	Lea	
June	6, 1891	Des Moines	
June	10, 1891	Tabor	
June	17, 1891	Gastana	
July	10, 1891	Centina	
July	18, 1891	Centerville	
Aug.	18, 1891	Acel	April 22, 1900
Aug.	10, 1891	Earling	
Oct.	12, 1891	Le Mar	
Nov.	11, 1891	Sioux City	April 21, 1900
Dec.	1, 1891	Central City	
Jan.	5, 1892	Marshalltown	
Jan.	12, 1892	St. Madison	
Feb.	29, 1892	Washington	
Feb.	7, 1892	Anamosa	
Feb.	12, 1892	Rockwell City	
Apr.	12, 1892	Woodstock	
Apr.	18, 1892	Oakland	
May	14, 1892	Columbus Junction	
May	14, 1892	Minburn	
June	21, 1892	Peoria, Ill.	
June	21, 1892	Corning	
July	5, 1892	Des Moines	
July	5, 1892	Alnaworth	
July	5, 1892	Des Moines	
Aug.	19, 1892	Monticello	
Aug.	19, 1892	Ottumwa	
Sept.	6, 1892	Belle Plaine	
Sept.	6, 1892	Elkport	
Sept.	12, 1892	Mason City	
Sept.	20, 1892	Arcadia	
Oct.	4, 1892	Centerville	
Nov.	30, 1892	Dubuque	
Dec.	6, 1892	Casey	
Jan.	14, 1893	Bayard	
Jan.	14, 1893	Decorah	
Jan.	18, 1893	Sidney	
Mar.	10, 1893	Fonda	
Mar.	8, 1893	Shellsburg	
Mar.	8, 1893	Kossauqua	
Apr.	11, 1893	Hancock	
Apr.	11, 1893	Marshalltown	
May	6, 1893	Manning	
May	6, 1893	Walker	
May	20, 1893	Jolley	
May	20, 1893	Dubuque	
May	31, 1893	Williams	
June	18, 1893	Williams	

ABSTRACT

Number of certificate.	NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
4514	Shelton Beards R	Sept. 4, 1893	By examination.	Fairfield.			
4515		Sept. 4, 1893		Jefferson	Manning.	Oct. 20, 1893	
4516		Oct. 4, 1893		Atlantic			
4517		Oct. 4, 1893		Warren			
4518		Oct. 21, 1893		Van Horn.	Jefferson.	Feb. 4, 1894	
4519		Oct. 21, 1893		Glenwood.			
4520		Nov. 7, 1893		Windsor	Sec City.	Oct. 24, 1893	
4521		Nov. 7, 1893		Mooreville.	Sec City.	Nov. 24, 1894	
4522		Dec. 4, 1893		Stanton.	Sec City.		
4523		Dec. 12, 1893		Des Moines	Sec City.		
4524		Dec. 12, 1893		Hubbard.	Grafton.	Dec. 20, 1893	
4525		Feb. 4, 1894		Wesley.			
4526		April 4, 1894		Le Mars.	Trar.	Oct. 7, 1897	
4527		April 17, 1894		Bloomfield.	Alton	Sept. 24, 1894	
4528		April 17, 1894		Earlville.			
4529		April 24, 1894		Burlington.	Delhi.	May 15, 1894	
4530		June 12, 1894		Burlington.	St Charles	Aug. 21, 1894	
4531		June 12, 1894		Burlington.			
4532		June 12, 1894		Burlington.	Armstrong.	Jan. 2, 1895	
4533		June 12, 1894		Le Mars.			
4534		June 12, 1894		Benson.			
4535		June 12, 1894		Belle Plaine	Des Moines.	June 12, 1895	
4536		June 12, 1894		Marble Rock.			
4537		July 2, 1894		Williams.			
4538		July 2, 1894		Monticello	Belle Plaine.	Sept. 7, 1899	
4539		Sept. 4, 1894		Lake Mills.			
4540		Sept. 12, 1894		Gardison	Winthrop.	Mar. 20, 1899	
4541		Sept. 12, 1894		Meriden	Tama.	Mar. 15, 1897	
4542		Sept. 12, 1894		Webster.	Eddyville.	Oct. 5, 1894	
4543		Mar. 2, 1895		Elberon.			
4544		Aug. 24, 1894		Stonx City.			
4545		Dec. 4, 1894		Fort Madison.	Burlington.	June 24, 1899	
4546		Dec. 27, 1894		West Side.	Latimer.	Aug. 12, 1895	
4547		Dec. 27, 1894		Stonx City.			
4548		Jan. 12, 1895		Gladbrook.			
4549		Feb. 4, 1895		Waterville.	Eagle Grove.	Aug. 12, 1897	
4550		Mar. 5, 1895		Stonx City.			

No.	Name	Date
1897	Leon	Sept. 26, 1898
1898	Nevada	Oct. 10, 1898
1899	Sexton	Mar. 15, 1897
1900	Corwith	May 2, 1898
1901	Madrid	Jan. 9, 1895
1902	Garnier	May 21, 1898
1903	Marble Rock	June 10, 1897
1904	Bayard	Nov. 14, 1896
1905	Bristow	Sept. 2, 1896
1906	Garvin	June 28, 1898
1907	Dumont	Jan. 17, 1899
1908	Leland	Oct. 17, 1898
1909	Swan City	July 28, 1897
1910	Maxwell	April 16, 1899
1911	Pordsmouth	May 12, 1898
1912	Perry	Mar. 16, 1899
1913	Britt	June 28, 1899
1914	Kearville	Mar. 25, 1897
1915	Montezuma	Feb. 11, 1899
1916	Manilla	Mar. 14, 1899

A BETTER ACT—CONTINUED.

No. in order of reg.	NAME.	DATE OF REGISTRA- TION.	HOW REGISTERED.	PLACE OF REGISTRA- TION.	LATEST REPORTED ADDRESS.	DAYS OF LAST CHANGE.	REMARKS.
8340	Smith, A. M.	April 6, 1907	By examination.	Weakos.	Tionka.....	Dec. 23, 1908	
8341	"	April 6, 1907	"	"	Dalpos.....	Aug. 14, 1908	
8342	"	May 4, 1907	"	"	"	"	
8343	"	June 1, 1907	"	"	Red Oak.....	May 2, 1908	
8344	"	July 6, 1907	"	"	Templeton.....	Sept. 20, 1908	
8345	A.....	Sept. 1, 1907	"	"	"	"	
8346	"	Oct. 1, 1907	"	"	Newton.....	April 25, 1908	
8347	"	Nov. 1, 1907	"	"	"	"	
8348	"	Dec. 1, 1907	"	"	"	"	
8349	E. P.....	Jan. 1, 1908	"	"	"	"	
8350	"	Feb. 1, 1908	"	"	"	"	
8351	"	Mar. 1, 1908	"	"	"	"	
8352	"	Apr. 1, 1908	"	"	"	"	
8353	"	May 1, 1908	"	"	"	"	
8354	"	June 1, 1908	"	"	"	"	
8355	"	July 1, 1908	"	"	"	"	
8356	"	Aug. 1, 1908	"	"	"	"	
8357	"	Sept. 1, 1908	"	"	"	"	
8358	"	Oct. 1, 1908	"	"	"	"	
8359	"	Nov. 1, 1908	"	"	"	"	
8360	"	Dec. 1, 1908	"	"	"	"	
8361	"	Jan. 1, 1909	"	"	"	"	
8362	"	Feb. 1, 1909	"	"	"	"	
8363	"	Mar. 1, 1909	"	"	"	"	
8364	"	Apr. 1, 1909	"	"	"	"	
8365	"	May 1, 1909	"	"	"	"	
8366	"	June 1, 1909	"	"	"	"	
8367	"	July 1, 1909	"	"	"	"	
8368	"	Aug. 1, 1909	"	"	"	"	
8369	"	Sept. 1, 1909	"	"	"	"	
8370	"	Oct. 1, 1909	"	"	"	"	
8371	"	Nov. 1, 1909	"	"	"	"	
8372	"	Dec. 1, 1909	"	"	"	"	
8373	"	Jan. 1, 1910	"	"	"	"	
8374	"	Feb. 1, 1910	"	"	"	"	
8375	"	Mar. 1, 1910	"	"	"	"	
8376	"	Apr. 1, 1910	"	"	"	"	
8377	"	May 1, 1910	"	"	"	"	
8378	"	June 1, 1910	"	"	"	"	
8379	"	July 1, 1910	"	"	"	"	
8380	"	Aug. 1, 1910	"	"	"	"	
8381	"	Sept. 1, 1910	"	"	"	"	
8382	"	Oct. 1, 1910	"	"	"	"	
8383	"	Nov. 1, 1910	"	"	"	"	
8384	"	Dec. 1, 1910	"	"	"	"	
8385	"	Jan. 1, 1911	"	"	"	"	
8386	"	Feb. 1, 1911	"	"	"	"	
8387	"	Mar. 1, 1911	"	"	"	"	
8388	"	Apr. 1, 1911	"	"	"	"	
8389	"	May 1, 1911	"	"	"	"	
8390	"	June 1, 1911	"	"	"	"	
8391	"	July 1, 1911	"	"	"	"	
8392	"	Aug. 1, 1911	"	"	"	"	
8393	"	Sept. 1, 1911	"	"	"	"	
8394	"	Oct. 1, 1911	"	"	"	"	
8395	"	Nov. 1, 1911	"	"	"	"	
8396	"	Dec. 1, 1911	"	"	"	"	
8397	"	Jan. 1, 1912	"	"	"	"	
8398	"	Feb. 1, 1912	"	"	"	"	
8399	"	Mar. 1, 1912	"	"	"	"	
8400	"	Apr. 1, 1912	"	"	"	"	
8401	"	May 1, 1912	"	"	"	"	
8402	"	June 1, 1912	"	"	"	"	
8403	"	July 1, 1912	"	"	"	"	
8404	"	Aug. 1, 1912	"	"	"	"	
8405	"	Sept. 1, 1912	"	"	"	"	
8406	"	Oct. 1, 1912	"	"	"	"	
8407	"	Nov. 1, 1912	"	"	"	"	
8408	"	Dec. 1, 1912	"	"	"	"	
8409	"	Jan. 1, 1913	"	"	"	"	
8410	"	Feb. 1, 1913	"	"	"	"	
8411	"	Mar. 1, 1913	"	"	"	"	
8412	"	Apr. 1, 1913	"	"	"	"	
8413	"	May 1, 1913	"	"	"	"	
8414	"	June 1, 1913	"	"	"	"	
8415	"	July 1, 1913	"	"	"	"	
8416	"	Aug. 1, 1913	"	"	"	"	
8417	"	Sept. 1, 1913	"	"	"	"	
8418	"	Oct. 1, 1913	"	"	"	"	
8419	"	Nov. 1, 1913	"	"	"	"	
8420	"	Dec. 1, 1913	"	"	"	"	
8421	"	Jan. 1, 1914	"	"	"	"	
8422	"	Feb. 1, 1914	"	"	"	"	
8423	"	Mar. 1, 1914	"	"	"	"	
8424	"	Apr. 1, 1914	"	"	"	"	
8425	"	May 1, 1914	"	"	"	"	
8426	"	June 1, 1914	"	"	"	"	
8427	"	July 1, 1914	"	"	"	"	
8428	"	Aug. 1, 1914	"	"	"	"	
8429	"	Sept. 1, 1914	"	"	"	"	
8430	"	Oct. 1, 1914	"	"	"	"	
8431	"	Nov. 1, 1914	"	"	"	"	
8432	"	Dec. 1, 1914	"	"	"	"	
8433	"	Jan. 1, 1915	"	"	"	"	
8434	"	Feb. 1, 1915	"	"	"	"	
8435	"	Mar. 1, 1915	"	"	"	"	
8436	"	Apr. 1, 1915	"	"	"	"	
8437	"	May 1, 1915	"	"	"	"	
8438	"	June 1, 1915	"	"	"	"	
8439	"	July 1, 1915	"	"	"	"	
8440	"	Aug. 1, 1915	"	"	"	"	
8441	"	Sept. 1, 1915	"	"	"	"	
8442	"	Oct. 1, 1915	"	"	"	"	
8443	"	Nov. 1, 1915	"	"	"	"	
8444	"	Dec. 1, 1915	"	"	"	"	
8445	"	Jan. 1, 1916	"	"	"	"	
8446	"	Feb. 1, 1916	"	"	"	"	
8447	"	Mar. 1, 1916	"	"	"	"	
8448	"	Apr. 1, 1916	"	"	"	"	
8449	"	May 1, 1916	"	"	"	"	
8450	"	June 1, 1916	"	"	"	"	
8451	"	July 1, 1916	"	"	"	"	
8452	"	Aug. 1, 1916	"	"	"	"	
8453	"	Sept. 1, 1916	"	"	"	"	
8454	"	Oct. 1, 1916	"	"	"	"	
8455	"	Nov. 1, 1916	"	"	"	"	
8456	"	Dec. 1, 1916	"	"	"	"	
8457	"	Jan. 1, 1917	"	"	"	"	
8458	"	Feb. 1, 1917	"	"	"	"	
8459	"	Mar. 1, 1917	"	"	"	"	
8460	"	Apr. 1, 1917	"	"	"	"	
8461	"	May 1, 1917	"	"	"	"	
8462	"	June 1, 1917	"	"	"	"	
8463	"	July 1, 1917	"	"	"	"	
8464	"	Aug. 1, 1917	"	"	"	"	
8465	"	Sept. 1, 1917	"	"	"	"	
8466	"	Oct. 1, 1917	"	"	"	"	
8467	"	Nov. 1, 1917	"	"	"	"	
8468	"	Dec. 1, 1917	"	"	"	"	
8469	"	Jan. 1, 1918	"	"	"	"	
8470	"	Feb. 1, 1918	"	"	"	"	
8471	"	Mar. 1, 1918	"	"	"	"	
8472	"	Apr. 1, 1918	"	"	"	"	
8473	"	May 1, 1918	"	"	"	"	
8474	"	June 1, 1918	"	"	"	"	
8475	"	July 1, 1918	"	"	"	"	
8476	"	Aug. 1, 1918	"	"	"	"	
8477	"	Sept. 1, 1918	"	"	"	"	
8478	"	Oct. 1, 1918	"	"	"	"	
8479	"	Nov. 1, 1918	"	"	"	"	
8480	"	Dec. 1, 1918	"	"	"	"	
8481	"	Jan. 1, 1919	"	"	"	"	
8482	"	Feb. 1, 1919	"	"	"	"	
8483	"	Mar. 1, 1919	"	"	"	"	
8484	"	Apr. 1, 1919	"	"	"	"	
8485	"	May 1, 1919	"	"	"	"	
8486	"	June 1, 1919	"	"	"	"	
8487	"	July 1, 1919	"	"	"	"	
8488	"	Aug. 1, 1919	"	"	"	"	
8489	"	Sept. 1, 1919	"	"	"	"	
8490	"	Oct. 1, 1919	"	"	"	"	
8491	"	Nov. 1, 1919	"	"	"	"	
8492	"	Dec. 1, 1919	"	"	"	"	
8493	"	Jan. 1, 1920	"	"	"	"	
8494	"	Feb. 1, 1920	"	"	"	"	
8495	"	Mar. 1, 1920	"	"	"	"	
8496	"	Apr. 1, 1920	"	"	"	"	
8497	"	May 1, 1920	"	"	"	"	
8498	"	June 1, 1920	"	"	"	"	
8499	"	July 1, 1920	"	"	"	"	
8500	"	Aug. 1, 1920	"	"	"	"	
8501	"	Sept. 1, 1920	"	"	"	"	
8502	"	Oct. 1, 1920	"	"	"	"	
8503	"	Nov. 1, 1920	"	"	"	"	
8504	"	Dec. 1, 1920	"	"	"	"	
8505	"	Jan. 1, 1921	"	"	"	"	
8506	"	Feb. 1, 1921	"	"	"	"	
8507	"	Mar. 1, 1921	"	"	"	"	
8508	"	Apr. 1, 1921	"	"	"	"	
8509	"	May 1, 1921	"	"	"	"	
8510	"	June 1, 1921	"	"	"	"	
8511	"	July 1, 1921	"	"	"	"	
8512	"	Aug. 1, 1921	"	"	"	"	
8513	"	Sept. 1, 1921	"	"	"	"	
8514	"	Oct. 1, 1921	"	"	"	"	
8515	"	Nov. 1, 1921	"	"	"	"	
8516	"	Dec. 1, 1921	"	"	"	"	
8517	"	Jan. 1, 1922	"	"	"	"	
8518	"	Feb. 1, 1922	"	"	"	"	
8519	"	Mar. 1, 1922	"	"	"	"	
8520	"	Apr. 1, 1922	"	"	"	"	
8521	"	May 1, 1922	"	"	"	"	
8522	"	June 1, 1922	"	"	"	"	
8523	"	July 1, 1922	"	"	"	"	
8524	"	Aug. 1, 1922	"	"	"	"	
8525	"	Sept. 1, 1922	"	"	"	"	
8526	"	Oct. 1, 1922	"	"	"	"	
8527	"	Nov. 1, 1922	"	"	"	"	
8528	"	Dec. 1, 1922	"	"	"	"	
8529	"	Jan. 1, 1923	"	"	"	"	
8530	"	Feb. 1, 1923	"	"	"	"	
8531	"	Mar. 1, 1923	"	"	"	"	
8532	"	Apr. 1, 1923	"	"	"	"	
8533	"	May 1, 1923	"	"	"	"	
8534	"	June 1, 1923	"	"	"	"	
8535	"	July 1, 1923	"	"	"	"	
8536	"	Aug. 1, 1923	"	"	"	"	
8537	"	Sept. 1, 1923	"	"	"	"	
8538	"	Oct. 1, 1923	"	"	"	"	
8539	"	Nov. 1, 1923	"	"	"	"	
8540	"	Dec. 1, 1923	"	"	"	"	
8541	"	Jan. 1, 1924	"	"	"	"	
8542	"	Feb. 1, 1924	"	"	"	"	
8543	"	Mar. 1, 1924	"	"	"	"	
8544	"	Apr. 1, 1924	"	"	"	"	
8545	"	May 1, 1924	"	"	"	"	
8546	"	June 1, 1924	"	"	"	"	
8547	"	July 1, 1924	"	"	"	"	
8548	"	Aug. 1, 1924	"	"	"	"	
8549	"	Sept. 1, 1924	"	"	"	"	
8550	"	Oct. 1, 1924	"	"	"	"	
8551	"	Nov. 1, 1924	"	"	"	"	
8552	"	Dec. 1, 1924	"	"	"	"	
8553	"	Jan. 1, 1925	"	"	"	"	
8554	"	Feb. 1, 1925	"	"	"	"	
8555</							

ABSTRACT—CONTINUED.

NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
Thompson, A. O.	June 17, 1894	By examination.	Des Moines.	Wapello.	Mar. 16, 1898	
Tobey, E. F.	May 20, 1894		Green Mountain.	Des Moines.	June 20, 1898	
Thomas, J. O.	June 21, 1897		What Cheer.	Mechanick.	Aug. 5, 1897	
	June 21, 1897		Boone.	Linden.	April 21, 1899	
	Aug. 16, 1897		Nevada.	Winterset.	Jan. 7, 1899	
	Mar. 16, 1898		Audubon.	Sioux City.	April 1, 1901	
	Mar. 30, 1898		Salix.	Harper.		
	July 2, 1899		Williamsburg.			
	July 27, 1898		Ostana.			
	Aug. 21, 1898		Fredericksburg.			
	Aug. 27, 1898		Sioux City.			
	April 15, 1899		Delwein.			
	Aug. 2, 1899		Dubuque.			
	Sept. 2, 1899		Anthony.			
	Sept. 17, 1899		Iowa Falls.			
	Oct. 7, 1899		Collins.			
	Jan. 29, 1901		Victor.			
	July 7, 1901		Bloomfield.			
	Nov. 25, 1901		Goldfield.			
	Mar. 1, 1895		Spirit Lake.			
	Mar. 2, 1895		Greston.			
	Jan. 10, 1895		Brooklyn.			
	Jan. 4, 1895		Des Moines.			
	Feb. 4, 1895		Garroll.			
	Jan. 21, 1895		Postville.			
	April 4, 1895		Waterloo.			
	June 7, 1895		Kanrar.			
	Aug. 1, 1895		Garroll.			
	Jan. 2, 1894		Betherville.			
	June 5, 1894		Sioux City.			
	June 20, 1894		Greenfield.			
	Aug. 2, 1894		Centerville.			
	Oct. 4, 1894		Des Moines.			
	Dec. 4, 1894		Dubuque.			
	Jan. 1, 1896		Central City.			
	April 5, 1894		Adair.			
				Adel.	Aug. 27, 1897	
				Dubuque.	May 11, 1897	
				Gilmore City.	July 15, 1899	

Number of Certificates

4993	July 1, 1895	Des Moines.	Rowley.....	Mar. 9, 1896
4995	Oct. 1, 1895	Colfax.	.....	.....
4996	Feb. 4, 1896	Monona.	.....	.....
5010	Mar. 5, 1896	Oarroll.	Laverne.....	July 6, 1897
5031	April 21, 1896	Corwith.	.....	.....
5110	June 22, 1896	Murray.	.....	.....
5107	July 7, 1896	Adair.	.....	.....
5185	Jan. 5, 1897	Wyoming.	.....	.....
5186	Jan. 5, 1897	Dubuque.	.....	.....
5199	Jan. 5, 1897	State Center.	Olga.....	Dec. 15, 1897
5201	Jan. 14, 1897	Victor.....	Keeos.....	Sept. 17, 1897
5259	Feb. 2, 1897	Union.	.....	.....
5260	April 6, 1897	Des Moines.	.....	.....
5306	July 6, 1897	Waterloo.	.....	.....
5397	July 6, 1897	Whiting.	.....	.....
5398	July 6, 1897	Fairfield.	.....	.....
5440	Oct. 5, 1897	Des Moines.	Randolph.....	April 20, 1898
5485	Dec. 7, 1897	Osage.....	Eldora.....	May 23, 1898
5490	April 5, 1898	Centerville.	.....	.....
5491	Mar. 5, 1898	Vinton.....	Urbana.....	Mar. 9, 1899
5502	May 5, 1898	Glenwood.	.....	.....
5506	June 7, 1898	Charles City.	.....	.....
5545	June 8, 1898	Des Moines.	.....	.....
5595	Aug. 3, 1898	Albia.....	Indianola.....	Mar. 24, 1899
5605	Jan. 3, 1899	Marshalltown.	Hawarden.....	Aug. 1, 1899
5606	May 2, 1899	Wyoming.	Aurora.....	July 15, 1899
5737	May 2, 1899	Des Moines.	.....	.....
5769	July 6, 1899	Waterloo.	.....	.....
5771	Aug. 1, 1899	Des Moines.	.....	.....
5779	Aug. 1, 1899	Des Moines.	.....	.....
584	Aug. 1, 1899	Iowa City.	.....	.....
585	Jan. 15, 1900	Ottumwa.	.....	.....
585	June 2, 1900	Des Moines.	Birmingham.....	Jan. 23, 1900
585	April 2, 1900	Vinton.	.....	.....
4615	April 2, 1900	Dubuque.	.....	.....
4739	Sept. 15, 1900	Elkader.	Dexter.....	June 25, 1907
4813	Feb. 5, 1901	Des Moines.	What Cheer.....	Dec. 2, 1908
5385	Oct. 4, 1904	Burlington.	.....	.....
5400	Nov. 7, 1904	Belle Plaine.	.....	.....
544	June 2, 1907	Mount Pleasant.	.....	.....
587	June 2, 1907	.....	Neola.....	Mar. 7, 1901
5977	July 6, 1907	.....	.....	.....
5947	Jan. 17, 1901	.....	.....	.....
5985	Jan. 27, 1903	.....	Des Moines.....	April 8, 1907
5987	Feb. 21, 1903	.....	.....	.....
5991	April 7, 1905	.....	Oaklaose.....	Mar. 21, 1900
5992	Feb. 21, 1905	.....	.....	.....
5993	Feb. 2, 1909	.....	Gowrie.....	Oct. 20, 1905
5994	Feb. 2, 1909	.....	Humeston.....	Dec. 7, 1906
5995	June 11, 1909	.....	.....	.....
5996	May 5, 1901	.....	.....	.....

ABSTRACT—CONTINUED.

Number of certificate.	NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DAYS OF LAST CHANGE.	REMARKS.
4126	Vall, Ed Morris.....	Nov. 10, 1891	As owner	Marshalltown.			
4127	"	Feb. 6, 1894	As owner	Des Moines.		Mar. 24, 1896	
4128	"	Feb. 6, 1894	As owner	Beranton	Callender.....	Aug. 13, 1895	
4129	"	Mar. 7, 1894	As owner	Oskaloosa	New Sharon.....		
4130	"	April 6, 1894	As owner	Granville.			
4131	"	May 6, 1894	As owner	Gilston			
4132	"	May 6, 1894	As owner	Harpur		Feb. 12, 1899	
4133	"	May 6, 1894	As owner	Cedar Rapids.			
4134	"	May 6, 1894	As owner	Beaumont		Nov. 14, 1896	
4135	"	Oct. 6, 1894	As owner	Storm Lake.	Ottoman.....		
4136	"	Dec. 12, 1894	As owner	Applington.			
4137	"	May 20, 1895	As owner	Des Moines.			
4138	"	Aug. 20, 1895	As owner	Lowood.	Burt.....	Oct. 21, 1898	
4139	"	July 10, 1899	As owner	De Witt.			
4140	"	June 7, 1899	As owner	Fairbank.	Webster City.....	Mar. 24, 1904	
4141	"	June 7, 1899	As owner	Boone.			
4142	"	June 7, 1899	As owner	Butterville.			
4143	"	June 7, 1899	As owner	Atlantic.			
4144	"	June 7, 1899	As owner	Cherokee.			
4145	"	June 7, 1899	As owner	Cedar Falls.			
4146	"	June 7, 1899	As owner	Center Point.			
4147	"	June 23, 1899	As owner	Oskamug.			
4148	"	June 23, 1899	As assistant	Dubuque.			
4149	"	June 23, 1899	As owner	Alaaworth.			
4150	"	June 23, 1899	As owner	Emmetsburg.			
4151	"	June 10, 1899	As assistant	Gilman.			
4152	"	June 10, 1899	As owner	Gilman.			
4153	"	June 10, 1899	As owner	Hupkinton.			
4154	"	June 10, 1899	As owner	Hesper.			
4155	"	June 10, 1899	As owner	Kearville.			
4156	"	June 10, 1899	As owner	Decorah.			
4157	"	June 10, 1899	As owner	Cedar Rapids.			
4158	"	June 10, 1899	As assistant	McGregor.			
4159	"	June 10, 1899	As owner	Chaplin.	Des Moines.	May 12, 1900	
4160	"	June 10, 1899	As owner	Northwood.	Briskow ..		
4161	"	June 10, 1899	As assistant	Des Moines.	Olarinda.....	Mar. 24, 1900	
4162	"	July 10, 1899	As owner	Des Moines.			
4163	Ward, O. H.	July 10, 1899	As owner	Des Moines.			Out of business.

COMMISSIONERS OF PHARMACY.

Des Moines.	Bloomfield	Oct. 7, 1896
Perry.	St. Charles.	June 7, 1899
Bandolph.		
Shenandoah.		
Unionville.		
Waterloo.		
Waterloo.		
Burlington.		
Atlantic.		
Low Virginia.		
New Virginia.		
Correctionville.	Halvor.	May 8, 1893
Carroll City.	Des Moines	Sept. 17, 1897
Fairfield.		
Waukegan.		
Volga City.		
Oswein.		
Nashua.		
Lyons.		
Strawberry Point.		
Keara.	Waterloo.	Sept. 1, 1891
Lenox.	Correctionville.	Jan. 29, 1893
	Manila.	Feb. 29, 1897
	Leoni.	Feb. 12, 1897
	Leatherville.	Mar. 24, 1897
	Centerville.	Aug. 21, 1898
	Oswein.	May 6, 1898
	Central City.	Sept. 8, 1892
	Kingsey.	July 28, 1895
	Eagle Grove.	Dec. 2, 1895
	Fort Dodge.	April 23, 1899
	Panora.	
	Elma.	Mar. 2, 1897
	Andubon.	Mar. 26, 1896

ABSTRACT—Continued.

Number of certificate.	NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHANGE.	REMARKS.
3195	Willis, Frank.....	Mar. 20, 1897	By examination.....	Perry View.....	Storn Lake.....	May 10, 1904	Out of business.
3197	Mar. 21, 1897	.....	Lebo Vista.....	.....	.....	.....
3198	Mar. 17, 1897	.....	Morris.....	Boile.....	Mar. 7, 1900	.....
3200	May 17, 1897	.....	De Witt.....	.....	.....	.....
3204	June 4, 1897	.....	Des Moines.....	.....	.....	.....
3205	June 21, 1897	.....	Holstein.....	.....	.....	.....
3206	June 4, 1897	.....	What Cheer.....	Council Bluffs.....	June 2, 1900	.....
3208	Aug. 4, 1897	.....	Conrad.....	Van Horna.....	.....	.....
3210	Oct. 8, 1897	.....	Bellevue.....	.....	.....	.....
3211	Nov. 2, 1897	.....	Adair.....	.....	.....	.....
3212	Jan. 27, 1898	.....	Emmell.....	.....	.....	.....
3213	Feb. 5, 1898	.....	Kimbley.....	.....	.....	.....
3214	Mar. 28, 1898	.....	Des Moines.....	.....	.....	.....
3215	Jan. 8, 1898	.....	Newburn.....	Chariton.....	Dec. 18, 1900	Out of business.
3217	April 1, 1898	.....	Corning.....	.....	.....	In Kansas.
3218	May 15, 1898	.....	Colin.....	.....	.....	.....
3219	May 14, 1898	.....	Griannel.....	.....	.....	.....
3220	July 14, 1898	.....	Decorah.....	.....	.....	.....
3221	Aug. 8, 1898	.....	West Liberty.....	Calmar.....	June 27, 1900	.....
3222	Aug. 21, 1898	.....	Ms. Ar.....	.....	.....	.....
3223	Sept. 4, 1898	.....	Warner.....	Clarion.....	Mar. 11, 1905	.....
3224	Oct. 18, 1898	.....	Chermost.....	West Union.....	Mar. 9, 1905	.....
3225	Nov. 19, 1898	.....	Strong City.....	.....	.....	.....
3226	Nov. 29, 1898	.....	Ms. Carmel.....	Boile.....	Aug. 20, 1907	.....
3227	Feb. 19, 1899	.....	Conway.....	.....	.....	.....
3228	Feb. 19, 1899	.....	Afton.....	.....	.....	.....
3229	April 24, 1899	.....	Oskaloosa.....	.....	.....	.....
3230	May 5, 1899	.....	What Cheer.....	.....	.....	.....
3231	May 27, 1899	.....	McGregor.....	.....	.....	.....
3232	June 4, 1899	.....	Calliope.....	.....	.....	.....
3233	Sept. 4, 1899	.....	Cambridge.....	Hawarden.....	Mar. 10, 1900	.....
3234	Sept. 17, 1899	.....	Malbourne.....	Bunnels.....	Nov. 11, 1901	.....
3235	Nov. 29, 1899	.....	Bedrick.....	.....	.....	.....
3236	Jan. 7, 1900	.....	Kingstley.....	Holstein.....	June 4, 1900	Out of business.
3237	Jan. 4, 1900	.....	Wilo.....	.....	.....	.....
3238	Feb. 18, 1900	.....	Prin.....	.....	.....	.....
3239	Feb. 29, 1900	.....	.....	.....	.....	.....
3240	Mar. 4, 1900	.....	.....	Akron.....	Mar. 10, 1901	.....


.....	Nevada.....	July 5, 1905
.....	Las Molinos.....	Mar. 14, 1905
.....	Dallas Center.....	Sept. 6, 1905
.....	Carlisle.....	Sept. 10, 1905
.....	Mechanicsville.....	Nov. 24, 1905
.....	Charlton.....	Jan. 5, 1906
.....	Ooligan.....	June 24, 1906
.....	Oxford.....	Nov. 25, 1907
.....	Mason City.....	Nov. 5, 1905
.....	Harcourt.....	Dec. 14, 1907
.....	Kalona.....	Mar. 10, 1904
.....	Delmar.....	.....
.....	Redfield.....	Oct. 15, 1906

ABSTRACT.

	NAME.	DATE OF REGISTRATION.	HOW REGISTERED.	PLACE OF REGISTRATION.	LATEST REPORTED ADDRESS.	DATE OF LAST CHARGE.	REMARKS.
4699	Wiltz, J. H.	July 2, 1894	By examination.	Pomeroy.			
4695	Watts, J. E.	July 2, 1894		Waterloo.			
4708	Wilson, W. E.	Aug. 7, 1894		Ruthven.			
4770		Nov. 6, 1894		Cedar Falls.		May 19, 1897	
4774		Nov. 17, 1894		Monroe.	Bonaparte.		
4805		Jan. 22, 1895		Katherville.			
4881		Feb. 2, 1895		Eagle Grove.	Lake City.	Mar. 22, 1897	
4850		Mar. 26, 1894		Sheldon.	George.	Oct. 12, 1896	
4856		Mar. 26, 1894		St. Dodge.	Barnum.	Mar. 21, 1897	
4867		April 2, 1894		Hopkinton.			
4867		July 2, 1895		Bancroft.			
4994		Aug. 2, 1895		Bigourney.			
4990		Sept. 2, 1895		Bloomfield.			
4960		April 2, 1895		Ruthven.			
5002		Feb. 2, 1895		New Hampton.	Latimer.	Jan. 24, 1898	
5004		Mar. 31, 1895		Scranton.	Malvern.	Aug. 25, 1895	
5004		Mar. 2, 1895		Eagle Grove.			
5025		Mar. 2, 1894		Dubuque.	Latimer.	Oct. 27, 1895	
5025		Mar. 2, 1894		Wilcox.	Nevada.	May 26, 1895	
5110		April 7, 1895		Colfax.			
5119		July 4, 1895		Burlington.			
5106		Aug. 4, 1895		Barter.			
5171		Sept. 1, 1895		Hudson.			
5267		Dec. 1, 1895		Atalissa.			
5267		Feb. 2, 1897		Iowa City.	Wellman.	May 27, 1897	
5261		Mar. 2, 1897		Waterloo.	Barnum.	Aug. 2, 1899	
5261		Mar. 2, 1897		Charlinda.			
5260		April 6, 1897		Waverly.			
5276		June 1, 1897		Fonda.	Marathon.	Mar. 21, 1899	
5277		June 1, 1897		Delta.	Monroe.	Aug. 20, 1897	
5241		Oct. 2, 1897		Manning.			
5243		Oct. 2, 1897		Manning.	New Market.	April 21, 1899	
5343		Oct. 2, 1897		Griswold.			
5343		Nov. 2, 1897		Hull.	Lawwood.	Feb. 2, 1898	
5346		Nov. 2, 1897		Waterloo.	Eldora.	Mar. 16, 1898	
5346		May 9, 1896		Des Moines.			
5370		Dec. 7, 1897		De Bots.			
5370	Watson, J. O.						
5370	Wenham, S. E.						
5370	Wenke, Carl.						
5370	Wright, C. M.						


In Memoriam


Charles A. Weaver

**Secretary of the
Pharmacy Commission
from 1881 to 1892**


**Born at York, Pennsylvania, 1882
Died at Des Moines, Iowa, June 25, 1899**


REGISTERED PHARMACISTS BY COUNTIES.

ADAIR.

5966 Adams, E. H.....Berea	2476 McOlintock, J. M.....Adair
4953 Culverson, F. P.....Greenfield	3467 Mulhern, J. W.....Adair
3991 Dodson, W. F.....Bridgewater	5520 McEvoy, M. T.....Adair
5206 Harper, J. A., Jr. ....Greenfield	5666 Pote, G. J.....Bridgewater
4961 Heath, Lawrence.....Bridgewater	1141 Scott, O. B.....Fontanelle
5540 Jarvis, O. B.....Blockton	3432 Stoll, W. W.....Greenfield
4870 Kingery, J. F.....Orient	4656 West, Jesse A.....Greenfield
3739 Love, Chas.....Greenfield	4865 Trumbull L.....Adair
4046 Leach, J. A.....Greenfield	5107 Trumbull, Mrs. D. F.....Adair
1140 McDermitt, Peter.....Fontanelle	5395 Wilson, J. A.....Greenfield

ADAMS.

498 Booth, A. E.....Prescott	3453 Potter, F. E.....Corning
2126 Coakley, J. W.....Mt. Etna	382 Rawson, A. A.....Corning
3078 Henry Charles.....Corning	1476 Sweet, H. L.....Mt. Etna
5235 Harris, H. H.....Corning	2490 Salts, A. J.....Corning
4751 Jackson, M. E.....Carbon	4087 Shinn, Mamie O.....Corning
728 Peregrine, O. S.....Brooks	4962 Shinn, A. F.....Corning
1714 Peregrine, J. S.....Brooks	

ALLAMAKEE.

3428 Bayless, Chas. D.....Waukon	2779 Myers, S. O.....Rossville
1060 Douglass, B. N.....Postville	2734 Nachtwey, Theo.....Lansing
3018 Earl, W. O.....Waukon	3499 Pratt, A. E.....Waukon
1555 Gilchrist, W. P.....Waukon	1057 Staadt, A.....Postville
4072 Grimm, A. L.....Waukon	1058 Staadt, G.....Postville
3713 Hutter, V.....New Albin	4450 Shumaker, O. M.....Lansing
753 Markley, G. H.....Lansing	4381 Thoma, John M.....Postville

APPANOOSE.

817 Blosser, Geo. W.....Moulton	5473 Gale, W. S.....Moulton
4623 Buck, C. W.....Moravia	5573 Hays, W. S.....Centerville
5528 Beer, M. H.....Centerville	4050 Kauffman, Adolph.....Centerville
4030 Clark, J. W.....Centerville	365 McCreary, W. M.....Centerville
5095 Carr, O. G.....Unionville	5320 McCreary, H. B.....Centerville
4404 Duffield, O. J.....Mystic	2521 Powers, O. A.....Moulton
5441 Edwards, F. O.....Moulton	4602 Powers, J. H.....Centerville
2834 Forsyth Robert.....Jerome	5439 Taylor, J. B.....Centerville
4458 Forsyth, David B.....Mystic	3241 Wills, D. H.....Moravia
5377 Guinn, G. W.....Centerville	4049 Williams, Jack.....Centerville

AUDUBON.

3218 Bisom, C. L.....Brayton	5708 Frick, E. L.....Audubon
5628 Brorsen, M. O.....Audubon	4912 Mertz, O. E.....Gray
173 Oloughly, Wm.....Audubon	263 Roberts, A. H.....Audubon
3061 Houston, O. W.....Exira	1344 Rippey, L.....Audubon
4286 Hamler, W. A.....Exira	3000 Wilhelm, T. F.....Audubon

BENTON.

1285 Brubaker, J. S.....Vinton	295 Nichols, Edw.....Belle Plaine
2531 Bielenberg, J. R.....Keystone	1283 Palmer, W. S.....Vinton
3161 Brubaker, O. W.....Vinton	3257 Paul, B. F.....Blairstown
4252 Bille, John.....Mt. Auburn	5785 Paden, O. M.....Belle Plaine
4561 Bell, P. H.....Van Horn	513 Springer, J. T.....Norway
3291 Dingman, G. W., Jr.....Urbana	1888 Speers, G. W.....Vinton
3918 Elwood, J. D.....Van Horn	4301 Scrimgeour, O. A.....Belle Plaine
4401 Gregory, F. E.....Shellsburg	4717 Smith, E. F.....Belle Plaine
5532 Gilmore, Mary E.....Vinton	5338 Speers, J. O.....Vinton
5608 Gilmore, H. N.....Vinton	5483 Tague, Marion S.....Urbana
1280 Hopwood, A. L.....Vinton	4616 Ullum, S. A.....Vinton
4974 Helden, L. F.....Garrison	294 Van Meter, J. G.....Belle Plaine
5623 Jensen, F. W.....Belle Plaine	3391 Vincent, W. A.....Belle Plaine
3960 LaGrange, T. G.....Vinton	3342 Wirth, Cyrillus.....Van Horn
4321 McCorkle, G. E.....Shellsburg	5449 Welch, Jas.....Benton
5474 Markham, A. J.....Van Horn	4832 Young, E. M.....Shellsburg

TENTH BIENNIAL REPORT OF THE

BLACK HAWK.

3026 Bl	.....Laporte	5242 M	.....Waterloo
1405 O	.....Laporte	5257 M	.....Waterloo
5035 O	.....Laporte	5050 O	.....Cedar Falls
5436 O	.....Cedar Falls	3226 P	.....Cedar Falls
1341 F	.....Waterloo	5223 S	.....Waterloo
3677 H	.....Waterloo	3237 Bl	.....Hudson
3896 H	.....Waterloo	3534 St	.....Waterloo
4976 H	.....Cedar Falls	4220 St	.....Waterloo
5349 H	.....Cedar Falls	5226 T	.....Waterloo
5561 H	.....Cedar Falls	5737 T	.....Waterloo
2043 Jc	.....Waterloo	404 W	.....Cedar Falls
3023 Jc	.....Hudson	1226 W	.....Waterloo
3515 K	.....Waterloo	1230 W	.....Waterloo
4199 K	.....Waterloo	3004 W	.....Waterloo
4391 L	.....Waterloo	3000 W	.....Cedar Falls
4626 L	.....Waterloo	4223 W	.....Waterloo
3751 M	.....Cedar Falls	4225 W	.....Waterloo
4190 M	.....Laporte	4770 W	.....Cedar Falls
4716 M	.....Cedar Falls	5221 W	.....Waterloo
5140 M	.....Waterloo	5221 W	.....Waterloo
5174 M	.....Waterloo	5222 W	.....Waterloo
5304 M	.....Dunkerton		

BOONE.

223 A	.....Boone	3226 Is	.....Boone
890 D	.....Mineral Ridge	4226 Is	.....Boone
5126 D	.....Madrid	5179 K	.....Boone
3812 E	.....Boone	4424 L	.....Odgen
4537 E	.....Fraser	915 M	.....Boonsboro
1255 F	.....Boone	910 M	.....Boonsboro
3023 F	.....Madrid	4531 M	.....Boone
3103 G	.....Pilot Mound	3423 St	.....Boone
3197 G	.....Odgen	3523 St	.....Madrid
4276 G	.....Odgen	4121 St	.....Odgen
4729 G	.....Madrid	5574 St	.....Madrid
3164 H	.....Boone	2371 T	.....Boone
4342 H	.....Boone	302 W	.....Boone

BREMER.

1709 Arnold, Chas.	.....Waverly	3097 Guthrie, J. M.	.....Tripoli
1891 Broadie, A. A.	.....Waverly	4426 Guthrie, F. L.	.....Tripoli
2305 Bennett, J. W.	.....Waverly	3223 Henry, A. B.	.....Waverly
2703 Broadie, H. H.	.....Waverly	3023 Kaufman, E. J.	.....Waverly
5376 Bunn, A. I.	.....Janesville	4156 Koberle, T. A.	.....Sumner
4261 Converse, L. E.	.....Waverly	5414 Liffing, E. A.	.....Janesville
5142 Fish, G. H.	.....Plainfield	4225 Swarts, W. A.	.....Waverly
5225 Ferrand, B. E.	.....Sumner	5575 Stevenson, Archie.	.....Tripoli
5323 Ferrand, L. A.	.....Sumner	5250 Winner, Max E.	.....Waverly

BUCHANAN.

1596 B	.....Fairbank	5272 H	.....Hamilton
3741 B	.....Brandon	5170 M	.....Jesup
4479 B	.....Stanley	5223 M	.....Independence
4224 C	.....Jesup	3751 M	.....Independence
4226 C	.....Winthrop	4022 N	.....Independence
5225 C	.....Quasqueton	5747 W	.....Independence
5323 C	.....Winthrop	3237 E	.....Winthrop
5577 C	.....Independence	3234 E	.....Independence
5227 D	.....Fairbank	651 S	.....Independence
3628 E	.....Lamont	3226 S	.....Jesup
651 H	.....Brandon	4737 S	.....Winthrop
4026 H	.....Independence	650 T	.....Independence
4327 H	.....Lamont	2045 T	.....Aurora
1255 H	.....Jesup	4022 T	.....Rowley
1255 H	.....Jesup	2222 T	.....Aurora
3544 L	.....Lamont	2223 W	.....Independence
3509 L	.....Independence	347 W	.....Quasqueton
1678 M	.....Independence	5224 W	.....Winthrop
3426 M	.....Independence		

BUENA VISTA.

4129 Burgett, W. O.	.....Newell	2226 Niemann, Theo.	.....Newell
2226 Cameron, C. E.	.....Alta	4229 Quay, W. F.	.....Storm Lake
2709 Hadden, D. E.	.....Alta	4221 Roberts, Jos.	.....Linn Grove
4211 Hackett, O. W.	.....Marathon	4417 Swenson, S. N.	.....Storm Lake
4125 Harlen, O. C.	.....Storm Lake	3226 Skiff, W. O.	.....Storm Lake
5029 Hannum, W. J.	.....Marathon	4214 Smith, E. E.	.....Sioux Rapids
4222 Johnson, H. A.	.....Sioux Rapids	5173 Vogel, H. A.	.....Storm Lake
5463 Johnson, G. J.	.....Sioux Rapids	3276 Wahlstrom, J. A.	.....Marathon
2228 Lundvall, N. A.	.....Sioux Rapids	5224 Zinser, E. W.	.....Sioux Rapids
4223 Larson, Edw.	.....Alta		

COMMISSIONERS OF PHARMACY.

91

BUTLER.

2081 Burroughs, S. W.	Allison	5371 Kelly, M. J.	Parkersburg
2105 Burroughs, S. E.	Allison	4617 Merner, B. O.	Allison
3155 Burbank, B. W.	Allison	5064 Miller, Geo.	Parkersburg
3804 Baker, L. E.	Greene	4485 Olney, V. L.	Shell Rock
3099 Burbank, W. J.	Allison	4913 Ocker, L. M.	Appollington
500 Cole, J. L.	Greene	5124 Ordway, John O.	New Hartford
2074 Cole, G. T.	Greene	8 Playter, John B.	Bristow
4455 Clark, G. N.	Parkersburg	3867 Pfeiffer, Gustav.	Parkersburg
5287 Crawford, C. A.	Bristow	198 Rhoads, H. M.	Clarksville
1584 Dumont, T. A.	Dumont	273 Smith, W. H.	Shell Rock
5656 Fowle, Lloyd.	Clarksville	512 Springer, J. T.	Norway
1071 Bowenstein, W. M.	Parkersburg	5033 Steely, J. W.	Bristow
2087 Harrison, D. O.	Clarksville	5075 Steely, J. H.	Dumont
5458 Halloran, E. N.	Dumont	3150 Wick, R. E.	New Hartford

CALHOUN.

2305 Bullock, F. H.	Lake City	5610 L.	Lohrville
2449 Orlesinger, J. W.	Farmhamville	169 M.	Pomeroy
2081 Cook, V. W.	Lake City	4365 M.	Pomeroy
4185 Carmichael, C. O.	Lohrville	4713 M.	Manson
3786 Dean, A. F.	Rockwell City	5071 M.	Lohrville
2737 Foley, W. J.	Manson	5437 M.	Rockwell City
4353 Forrester, J. S.	Jolley	4007 E.	Rockwell City
4839 Ficken, J. F.	Jolley	4800 E.	Lake City
5203 Flemming, P. W.	Manson	4833 E.	Lohrville
3871 Hewa, R. H.	Rockwell City	4636 W.	Pomeroy
4734 Johnson, W. F.	Manson	4831 W.	Lake City
3475 Loser, A. B.	Lake City	683 Y.	Manson

CARROLL.

2146 Anderson, August.	Ooon Rapids	3231 M.	Arcadia
326 Beberger, G. T.	Carroll	3610 E.	Manning
3438 Bliss, N. G.	Manning	5306 E.	Ooon Rapids
5978 Downs, J. A.	Glidden	3175 S.	Carroll
1873 Foster, W. E.	Glidden	3326 S.	Carroll
2512 Feenstra, J. S. H.	Arcadia	4537 S.	Manning
325 Hutton, J. W.	Carroll	5305 S.	Templeton
5633 Hauptman, D. H.	Manning	3736 S.	Carroll
5740 Hamilton, J. V.	Carroll	3603 T.	Carroll
3408 Jones, U. C.	Breda	3630 T.	Dedham
4113 Jessen, B. T.	Arcadia	4486 T.	Carroll
4127 Lewis, J. A.	Manning	5341 W.	Manning
5030 Le Due, A. H.	Breda		

CASS.

703 Davis, M. J.	Lewis	247 Nichols, W. M.	Atlantic
3306 Davis, W. B.	Lewis	373 Nichols, Jonathan.	Atlantic
5006 Downs, F. B.	Lewis	637 Pipher, John.	Griswold
3037 Findley, W. J.	Atlantic	4020 Parson, Miss E. S.	Atlantic
3631 Fee, F. E.	Massena	1338 Scarr, G. F.	Cumberland
5315 Fried, A. F.	Wlota	3143 Snelson, William.	Massena
3121 Goas, J. S.	Atlantic	3553 Snelson, Lulu.	Massena
1863 Jones, J. B.	Atlantic	3891 Schlichting, E. A.	Griswold
4165 Jones, F. A.	Cumberland	5151 Snelson, P. B.	Massena
3381 Kishi, R. S.	Anita	5263 Schultz, George.	Cumberland
339 Major, E. S.	Anita	397 Wilkie, E. D.	Atlantic
2385 McOlees, O. H.	Marne	1431 Weber, E. O.	Atlantic
4740 Major, O. W.	Anita	5345 Wilwerding, J. M.	Griswold
5431 Mosier, D. O.	Atlantic		

CEDAR.

85 Billa, E. B.	Durant	5009 Hirschfeldt, Frank.	Tipton
331 Blair, W. H.	Clarence	3245 Gurgenson, P. H.	Lowden
1990 Brotherlin, H. L.	Tipton	1192 Mather, William.	Springdale
3977 Branson, Lora.	West Branch	1198 Mather, Charles E.	Springdale
4176 Coveny, T. H.	Mechanicsville	3671 Morgan, J. W.	Tipton
5345 Fullerton, L. L.	Tipton	5123 Nordhaus, O. A.	Stanwood
5352 Fish, H. D.	Tipton	1395 Ross, W. P., Jr.	Tipton
1768 Gould, C. E.	Mechanicsville	3373 Ross, C. K.	Tipton
3331 Gill, B. A.	West Branch	5081 Rehnert, Henry.	Tipton
4391 Gibeaut, H. E.	Mechanicsville	335 Smith, G. E.	Clarence
4413 Hoon, Grant.	Tipton	2638 Schumacher, H.	Durant

CERRO GORDO.

2350 A1	..... Mason City	4310 Frieberg, E. L.	Clear Lake
2352 A1	..... Mason City	2340 Howland, G. W.	Rockwell
2308 A1	..... Thornton	4323 Hughes, O. W.	Mason City
5745 A1	..... Clear Lake	5129 Hlatzen, H. F.	Plymouth
2359 B1	..... Clear Lake	5085 Kuchemann, R. F.	Meservey
4031 B1	..... Mason City	5427 Killmer, A. J.	Mason City
4319 B1	..... Mason City	2789 Lowry, George W.	Mason City
4414 B1	..... Meservey	5181 McMahon, Thomas	Clear Lake
4543 B1	..... Mason City	5325 Michael, P. L.	Mason City
1881 C1	..... Mason City	5526 McLaughlin, C. J.	Clear Lake
4300 C1	..... Mason City	4950 Qualey, Oint.	Swaledale
5461 C1	..... Mason City	3563 Robinson, O. E.	Clear Lake
4636 D1	..... Rockwell	5323 Rosemond, W. H.	Clear Lake
4673 D1	..... Mason City	1868 Stewart, O. M. C.	Mason City
5448 D1	..... Rockwell	4341 Waterbury, M. O.	Mason City
230 E1	..... Clear Lake		

CHEROKEE.

4425 Allen, O. E.	Marcus	2931 Quinn, C. F.	Meriden
2527 Blair, C. A.	Cherokee	4022 Rogers, U. O.	Washta
4990 Bundy, Edgar.	Aurelia	2374 Shaul, A. J.	Quimby
4453 Fry, W. N.	Marcus	3203 Schuster, H. J.	Cherokee
2265 Georges, A. G.	Marcus	2993 Shea, M. J.	Oleghorn
5299 Gerlach, Richard.	Cherokee	5156 Schuster, G. W.	Cherokee
2340 Hassels, J. C.	Larrabee	5506 Snyder, O. J.	Aurelia
4237 Holihan, J. H.	Washta		

CHICKASAW.

940 Briggs, L. L.	New Hampton	5211 Malloy, J. E.	New Hampton
2624 Blind, F. W.	Nashua	931 Olmstead, E. N.	New Hampton
2311 Gardner, H. W.	New Hampton	4917 Roe, C. O.	Nashua
5214 Henry, A. L.	Alta Vista	4309 Shambaugh, L. D.	Alta Vista
5481 Kendall, B. W.	Fredericksburg	3511 Taylor, L. M.	Fredericksburg
3158 Landon, J. E.	Lawler	1987 Woodbridge, M. L.	Nashua
2720 Moody, C. B.	Ionia	4640 Wilkins, J. S.	New Hampton

CLARKE.

4227 Ash, A. S.	Osceola	3225 London, L. W.	Osceola
2481 Blythe, Calvin.	Woodburn	4771 Landis, S. E.	Osceola
2773 Bolibaugh, W. R.	Osceola	2123 Martin, M. T.	Woodburn
810 Garretson, B. F.	Osceola	2993 Miller, E. L.	Murray
847 Landis S. L.	Osceola	5099 Rogers, A. L.	Murray
2941 Lawrence, Edw.	Osceola	4200 Sells, F. W.	Murray
3194 Landis, Jesse E.	Osceola		

CLAY.

2612 Bauer, W. S.	Everly	2721 Cottrel, G. B.	Spencer
3903 Bender, George B.	Spencer	4557 Cooper, G. E.	Peterson
3923 Brown, H. T.	Everly	5423 Oone, E. R.	Peterson
5408 Buck, E. M.	Spencer	3011 Dickey, E. L.	Spencer
5106 Benthall, Eugene.	Dickens	5154 Hall, O. E.	Everly
5140 Bjornstad, O. A.	Spencer	2829 Jones, P. W.	Peterson
5561 Bender, E. R.	Spencer	4245 Matthews, F. A.	Spencer

CLAYTON.

547 Bayles, F. B.	Elkader	4264 Henry, J. W.	Strawberry Point
1587 Bixby, E. J.	Edgewood	4322 Jones, W.	Volga City
1558 Blanchard, Lewis.	Edgewood	908 Kennedy, M. G.	McGregor
4024 Becker, William.	Elkader	2167 Ruenzel, H. O.	Garnaville
4351 Bliss, G. W.	McGregor	3145 Kriebs, George.	Elipport
5045 Ballentine, W. A.	Monona	2753 Kramer, Charles F.	McGregor
5079 Barnes, L. M.	Strawberry Point	1994 Newman, M. M.	Edgewood
5367 Bayless, M.	McGregor	4858 Oehring, C. O.	Elkader
5515 Becker, Caroline M.	Elkader	823 Peterson, S. J.	McGregor
4295 Fox, H. O.	Monona	4117 Royden, F. W.	Edgewood
3760 Graham, R. D.	Strawberry Point	5167 Schroeder, R. E.	Garnaville
543 Hagensick, H. H.	Elkader	5631 Stoehr, G. L.	North McGregor
2496 Hoag, E. H.	Strawberry Point	1267 White, W. P.	Volga City
2190 Heine, W. H.	Guttenberg	2573 Wood, G. N.	McGregor

CLINTON.

2263 Adams, J. R.	Lyons	5714 Lindblade, H. E.	Olintos
5188 Beard, A. E.	De Witt	188 McKenzie, H. M.	Elwood
5344 Boyd, J. C.	Clinton	189 McKenzie, Emma.	Elwood
5361 Blodt, J. J.	Clinton	263 Major, Oscar.	Clinton
2424 Cunningham, T. O.	Clinton	3124 McLain, George.	Clinton
6360 Cook, Blanche E.	Lost Nation	4180 Moffet, Ben J.	Clinton

COMMISSIONERS OF PHARMACY.

93

OLINTON—CONTINUED.

5178 DeLange, James.....	Clinton	4452 M	.....	Delmar
4890 Evans, J. W.	Clinton	4890 M	.....	Lost Nation
1290 Gamble, T. D.	Wheatland	5176 M	.....	Charlotte
359 Houston, G. W.	Clinton	5550 M	O.....	Clinton
3756 Hunt, Homer.....	Camasche	374 O	.....	Clinton
3898 Harrington, J. D.	Grand Mound	3243 R	.....	Lyons
3645 Hill, O. E.	Clinton	764 S	.....	Lyons
4204 Henning, W. E.	Clinton	2280 S	.....	Lyons
4654 Holmes, Eva E.	Clinton	3270 S	.....	Clinton
3722 John, M. H.	Clinton	4861 S	.....	Calamus
3328 Killheffer, J. S.	Clinton	3308 S	.....	Lost Nation
3545 Kent, O. F.	De Witt	5075 V	gbert.....	Clinton
1704 Langheim, J. M.	Charlotte	40 W	.....	De Witt
5134 Ludolph, H. W.	Clinton	415 W	.....	Calamus
6391 Large, J. B.	De Witt	1264 W	H.....	Lyons

CRAWFORD.

3284 Burk, Jas. F.	Denison	3287 Kinyon, L. W. ....	.....	Vail
3971 Bowney, A. F.	Buck Grove	3916 Lica, M. E. ....	.....	Denison
5237 Biglow, Zella.....	Charter Oak	4349 McGarvey, S. S. ....	.....	West Side
4576 Cassidy, L. M.	Denison	3549 McWilliams, J. J. ....	.....	Charter Oak
4701 Cronin, D. J.	Charter Oak	3245 Richardson, C. E. ....	.....	Denison
5335 Davis, G. H.	Dow City	3362 Roberts, F. J. ....	.....	Charter Oak
1781 Evans, W. B.	Arion	3900 Ryan, Milo.....	.....	Vail
3453 Gardner, J. B.	Manilla	2144 Schlumberger, P. A. ....	.....	Denison
4534 Hart, W. E.	West Side	5618 Saunders, H. A. ....	.....	Manilla
5381 Harrison, J. J.	West Side	3207 Westbrook, C. H. ....	.....	Manilla
1798 Kneul, Rudolph.....	Denison			

DALLAS.

5549 Anderson, A. G.	Redfield	5395 O'Malley, J. E. ....	.....	Perry
1833 Brookings, V. J.	Woodward	3734 Patter, J. M. ....	.....	Woodward
4940 Bundy, J. A.	Waukeo	4345 Pettit, L. N. ....	.....	Dallas Center
5317 Bundy, O. M.	Kennedy	437 Richmond, J. A. ....	.....	Dallas Center
2994 Draper, J. S.	Perry	3510 Rogers, E. R. ....	.....	Minburn
3980 Douglas, S. A.	Adel	458 Stanley, J. D. ....	.....	Dexter
5018 Dooley, E. P.	Perry	3753 Sinooke, J. L. ....	.....	Adel
5770 Basart, O. E.	Minburn	4947 Seidler, Wm.....	.....	Minburn
238 Freed, D. A.	Redfield	4837 Stanley, W. A. ....	.....	Dexter
4045 Forsyth, J. O.	Redfield	5139 Scarr, H. A. ....	.....	Perry
4888 Franks, W. N.	Perry	5408 Strauser, M. W. ....	.....	Linden
5100 Fuller, N. H.	Perry	4683 Taylor, J. L. ....	.....	Adel
4021 Gardner, G. H.	Perry	4813 Underwood, Wm.....	.....	Dexter
180 Long, G. P.	Perry	1047 Willis, A. E. ....	.....	Perry
3501 Loughlin, M. E.	Perry	3186 Willis, Frank.....	.....	Perry
4598 Loring, J. M.	Adel	4685 Walch, C. E. ....	.....	Redfield
604 McCollough, M. J.	Adel	5370 Wright, C. M. ....	.....	De Soto
3322 Mason, G. W.	Minburn			

DAVIS.

4261 Beauchamp, O. E.	Bloomfield	3785 Haslach, J. A. ....	.....	Bloomfield
5315 Brunk, L. D., Jr.	Bloomfield	3977 Harris, W. W. ....	.....	Bloomfield
3614 Cronk, O. H.	Bloomfield	309 McAchran, W. H. ....	.....	Bloomfield
77 Dunlavy, Jas.	Stiles	4377 Mathews, O. W. ....	.....	Pulaski
4314 Fugate, J. D.	Bloomfield	3283 Perry, C. H. ....	.....	Bloomfield
301 Gibbons, A. D.	Bloomfield	3388 Ramsey, E. R. ....	.....	Floris
4520 Gordonier, Isla.....	Pulaski	3297 Thompson, E. E. ....	.....	Linden
4621 Garrett, J. M.	Troy	2898 Shelton, A. H. ....	.....	Bloomfield
4761 Guernsey, J. J.	Bloomfield	4320 Wilson, F. M. ....	.....	Bloomfield
5515 Giles, Grant.....	Stiles			

DECATUR.

2241 Alexander, W. A.	Leon	2330 Laney, W. J. ....	.....	Davis City
4231 Armstrong, Ernest L.	Grand River	2299 Mitchell, Enos.....	.....	Weidon
373 Belding, A. L.	Van Wert	2287 Myers, W. E. ....	.....	Leon
4187 Bear, W. S.	Decatur City	4068 Mitchell, Mrs. E. H. ....	.....	Weidon
4308 Barrows, C. H.	Lamoni	3735 Potts, H. W. ....	.....	Garden Grove
5332 Bell, E. E.	Leon	475 Robinson, J. H. ....	.....	Davis City
5512 Bodier, V. L.	Leon	3225 Reynolds, Lillie E. ....	.....	Leon
5165 Bodier, Eugene L.	Leon	4038 Shumway, Harry.....	.....	Leon
2243 De Kalb, E. D.	De Kalb	4638 Stempel, W. O. ....	.....	Leon
4335 Edwards, Bert.....	Garden Grove	5446 Stiles, W. H. ....	.....	Garden Grove
4285 Graves, F. A.	Garden Grove	5110 Shields, J. S. ....	.....	Decatur City
3730 Hansen, J. H.	Lamoni	2234 Van Werden, Lewis.....	.....	Leon
7035 Honnold, F. J.	Leon	3232 Waight, W. F. ....	.....	Leon
5052 Haag, I. B. M.	Pleasanton	5410 Young, L. H. ....	.....	Leon
2120 Layton, H. E.	Leon			

DELAWARE.

3636	Anders, F. W.	Manchester	7	Lont, O. B.	Delaware
4719	Abbott, W. A.	Manchester	730	Livingston, Hugh	Hopkinton
4843	Armstrong, T. B.	Greeley	5754	Mulvihill, E. F.	Masonville
712	Bush, J. V.	Ocala	5853	Phillipp, A. C.	Manchester
4685	Rowman, R. H.	Delhi	919	Smith, H. O.	Manchester
4704	Donnelly, William	Ryan	5884	Smith, L. C.	Manchester
4538	Denton, E. A.	Masonville	5419	Storey, G. W.	Manchester
4308	Gregg, F. K.	Manchester	5519	Striegel, J. T.	Ryan
5465	Gearhart, N. A.	Hopkinton	480	Williamson, W. E.	Hopkinton
4898	Gibbons, A. S.	Ryan	4867	Williams, F. A.	Hopkinton
5051	Grens, B. W.	Manchester	5517	Ward, W. H.	Manchester
5044	Kendall, Charles	Earlville			

DES MOINES.

5903	B		5265	M	Burlington
5536	B		6313	M	Burlington
5990	O		1112	N	Burlington
3603	O		8164	N	Burlington
3674	O		2553	N	Burlington
4653	D		1633	P	Burlington
3770	F		2542	R	Burlington
3397	F		2736	R	Burlington
1539	H		119	S	Burlington
3496	H		1110	S	Burlington
4006	H		4945	S	Burlington
4273	H		4786	S	Burlington
4553	J		5612	S	Burlington
5195	K		1373	W	Burlington
4471	L		5119	W	Burlington
3396	L				

DICKINSON.

759	Brownell, E. L.	Spirit Lake	5055	Hageboeck, W. H.	Lake Park
4055	Barnore, V. A.	Lake Park	3559	Ingvalstad, O. O.	Milford
4799	Darheimer, W. F.	Spirit Lake	4924	McGrew, E. S.	Spirit Lake
4511	Erickson, N. L.	Milford	5953	Shultz, C. S.	Lake Park
1048	Farnham, L. H.	Spirit Lake	5006	Stoakes, E. E.	Superior
5790	Green, Arnold	Lake Park			

DUBUQUE.

1175	Brown, W. K.	Dubuque	1538	P	Dubuque
3519	Brown, C. J.	Dubuque	3157	P	Dubuque
4335	Becker, J. G.	Dubuque	4749	P	Dubuque
4804	Bruckner, Edward	Dyersville			Dubuque
5304	Barry, J. A.	Farley	477	R	Dubuque
5639	Dennert, Frank	Dubuque	3354	R	Dyersville
480	Frank, E. C.	Dubuque	4333	R	Dubuque
5339	Finn, F. B.	Dubuque	5337	R	Dyersville
5690	Falkenhainer, Charles	Dubuque	3353	R	Dubuque
4473	Grimm, A. G.	Dubuque	4343	R	Dubuque
4930	Glynn, T. H.	Cascade	4393	R	Dubuque
81	Harwood, George	Epworth	4464	R	Dubuque
433	Harvey, James	Dubuque	3710	R	Cascade
479	Hass, J. W.	Dubuque	327	T	Dubuque
4030	Hass, D. J.	Dubuque	431	T	Dubuque
4502	Hedley, J. E.	Dubuque	4781	T	Dubuque
326	LaNica, N. J. G.	Dubuque	5135	T	Dubuque
535	Livermore, C. A.	Cascade	4739	T	Dubuque
3454	Lisk, C. W.	Dubuque	450	V	Dubuque
4732	Lisk, W. C.	Dubuque	3019	V	Dubuque
4959	Loez, J. A.	Dubuque	4340	V	Cascade
3233	Oldridge, W. V.	Farley	5718	Z	Dubuque

EMMET.

4884	Amundson, O. O.	Etherville	4623	Stockwell, O. W.	Armstrong
5477	Amundson, H. J.	Wallingford	4544	Toole, Chas. O.	Etherville
2083	Colvin, A. W.	Armstrong	3378	Wilson, M. G.	Etherville
5754	Osain, E. B.	Etherville	4505	Williams, S. H.	Etherville
3199	Klopp, J. J.	Etherville			

FAYETTE.

4206	Adams, H. B.	Hawkeye	4595	Mettlin, A. J.	Oelwein
72	Burnside, J. M.	Waucoma	5333	Masters, O. L. E.	Maynard
4590	Bigler, L. E.	Wadena	4915	Noblett, E. C.	Hawkeye
4984	Bush, J. A.	Oelwein	5340	Pfeiffer, W. F.	Oelwein
5640	Bell, C. F.	West Union	3327	Raymond, W. T.	West Union
4096	Crowe, Will	Clermont	3699	Rathburn, D. C.	Fayette

FAYETTE—Continued.

5178 Collins, A. E.....	Oelwein	5478 Ez	Oelwein
555 Finke, W. H.....	Elgin	595 St	West Union
5407 Green, O. J.....	Oelwein	2504 St	Elgin
5436 Gowen, O. B.....	Westgate	3471 Sh	Brush Creek
12 Hubbard, G. A.....	Wancom	1990 W	Oelwein
2643 Hanes, G. W.....	Maysard	2935 W	Oelwein
4790 Hill, F. S.....	Oelwein	3018 W	D..... Fayette
1012 Jamison, G. W.....	Oelwein	3103 W	Fayette
4288 Jester, Lulu B.....	Hawkeye	3555 W	West Union
5301 Kriebbs, F. D.....	West Union	3598 W	Brush Creek
4443 McMartin, O. B.....	West Union	4063 W	Hawkeye
4548 Macomber, G. B.....	Maynard		

FLOYD.

935 Birney, O. O.....	ps	4511 May, B. W.....	
1143 Birney, Catherine.....	ps	4609 Miles, O. W.....	
1145 Birney, Lewis.....	ps	4903 Murray, Mame E.....	
8397 Brincken, Anton.....	rd	5788 Murray, M. J.....	
4376 Birney, Emma.....	ps	5998 Nauman, W. B.....	
5177 Bartz, E. N.....	rd	5003 Nolan, G. E.....	
5749 Brincken, Herman.....	rd	5020 Paddieford, J. F.....	
3545 Dodd, A. B.....	ty	4578 Smith, W. C.....	
4532 DeSmith, O. F.....	ty	4938 Speedling, Floyd.....	
3551 Jocelyn, B. S.....	ps	5553 Speedling, E. W.....	
3531 Legal, J. G.....	ty	5500 Treat, J. W.....	
1123 Miles, E. F.....	ty	4558 Yager, O. W.....	
3094 May, Geo. E.....	ty		

FRANKLIN.

2211 Abora, F. I.....	Shamald	4748 Lambert, G. H.....	Hampton
5309 Abora, F. O.....	Sheffield	4535 Lohan, J. W.....	Alexander
639 Baldwin, E. V.....	Hampton	4591 Marchal, O. Jr.....	Hampton
5761 Billingsly, B. F.....	Hampton	2217 Newhouse, H. E.....	Geneva
1851 Fink, E. M.....	Hampton	4443 Overton, W. T.....	Hampton
4374 Gressler, F. J.....	Chapin	4728 Stalford, G. A.....	Latimer
3579 Harriman, O. B.....	Hampton	5504 Storck, H. O.....	Sheffield
4728 Harriman, J. E.....	Hampton	1928 Tidd, O. H.....	Geneva
5333 Hoyt, A. L.....	Popejoy	5003 Wright, O. W.....	Latimer
5712 Jensen, J. W.....	Geneva	5325 Wunderlich, F. H.....	Latimer

FREMONT.

2175 Biddinger, J. W.....	Thurman	638 Mann, Jas.....	Hamburg
4464 Biddinger, L. H.....	Sidney	4240 Newhor, J. O.....	Riverton
4593 Boyer, W. M.....	Hamburg	1904 Otis, C. M.....	Tabor
3513 Cofe, J. H.....	Thurman	1225 Penn, A. V.....	Sidney
5379 Coleman, Carl.....	Farragut	167 Robbins, W. H.....	Farragut
3750 Doyle, C. E.....	Hamburg	501 Snyder, O. H.....	Tabor
1728 Harris, T. O.....	Bartlett	4078 Swatman, B. F.....	Tabor
4557 Halbert, M. M.....	Imogene	4411 Simons, Arthur B.....	Sidney
4507 Harris, L. O.....	Thurman	168 Trullinger, W. B.....	Farragut
4738 Kidd, Mrs. Emma F.....	Riverton	5340 Thomas, D. W.....	Randolph

GREENE.

616 Crow, W. M.....	Grand Junction	4105 McKelvey, W. O.....	Churdan
4631 Crow, E. E.....	Grand Junction	4497 Miller, Geo.....	Churdan
4764 Epperly, C. O.....	Jefferson	5446 McPheeters, B. B.....	Jefferson
671 Foy, E. W.....	Jefferson	5543 Morrison, E. D.....	Grand Junction
1533 Freeman, Edw.....	Jefferson	1463 Osborne, B. F.....	Ripley
3835 Foster, F. E.....	Scranton	2201 Olive, E. A.....	Scranton
5195 Glutner, J. S.....	Scranton	4314 Olive, E. W.....	Scranton
5095 Kirby, S. O.....	Grand Junction	5063 Petersmeyer, E. O.....	Scranton
4306 Lowery, O. W.....	Grand Junction	5416 Palmer, L. L.....	Paton
4494 Latta, K. C.....	Paton	4518 Shuey, J. F.....	Jefferson

GRUNDY.

5330 Alexander, Harry.....	Conrad	1088 Junger, Hugo.....	Reinbeck
912 Bowman, J. E.....	Conrad Grove	5494 Junger, W. F.....	Reinbeck
4268 Diehner, W. F.....	Wellsburg	4236 Ladage, H. W.....	Grundy Center
2250 Ellis, G. F.....	Grundy Center	4263 Ladage, W. O.....	Grundy Center
5300 Frahm, F. W.....	Beaman	3261 Mullarkey, W. G.....	Holland
2304 Hoag, E. L.....	Beaman	3510 Meyers, E. G.....	Reinbeck
2304 Hummel, Mathias.....	Grundy Center	3320 Meisner, Ernest.....	Reinbeck
4800 Heiberger, M. G.....	Grundy Center	5301 Rhea, W. F.....	Grundy Center
1511 Hummel, J. F.....	Grundy Center	3325 Wheeler, F. E.....	Conrad

TENTH BIENNIAL REPORT OF THE

GUTHRIE.

2605	Adair, O. B.	Yale	5090	Mendenhall, J. R.	Menlo
5853	Adair, Mabel B.	Yale	575	North, Henry	Casey
4845	Burrichter, W. O.	Panora	4715	Nichols, C. F.	Panora
4433	Crabbe, A. M.	Menlo	5229	Pohle, E. B.	Stuart
5755	Corbett, J. H.	Bayard	5065	Roberts, W. G.	Panora
2234	Dosh, Ed.	Guthrie Center	4367	Raber, A. S.	Stuart
2821	Doudna, O. B.	Bayard	2600	Smith, A. W.	Guthrie Center
1731	Herriott, John	Stuart	2910	Shaffer, O. W.	Casey
5712	Jones, M. L.	Guthrie Center	4395	Shaffer, J. S.	Casey
5792	Klingaman, O. B.	Bayard	4397	Shannon, E. S.	Jamaica
3223	Lakin, A. M.	Yale	5987	Smith, H. M.	Bayard
3306	Lemmon, A. D.	Guthrie Center	5105	Story, C. F.	Stuart
367	Maulsby, Ellis	Casey	1783	Treat, Jas. A.	Stuart
3307	McGhee, W. T.	Bagley			

HANCOCK.

4533	Amsden, W. O.	Garner	4790	Phelps, O. W.	Kanawha
4374	Borman, W. H.	Crystal Lake	4037	Robinson, A. J.	Britt
5320	Butts, G. W.	Goodell	5520	Ramsey, A. J.	Goodell
2723	Collins, Carrie S.	Garner	594	Smith, H. W.	Garner
4490	Carton, J. A.	Britt	4911	Severin, A. L.	Corwith
5148	Duckworth, T. O.	Crystal Lake	4973	Spohr, T. E.	Garner
4143	Harr, J. L.	Klemme	5145	Snow, Matilda B.	Garner
2530	Medowell, Arthur	Crystal Lake	5180	Sarset, W. F.	Britt
4260	Mulligan, W. H.	Crystal Lake	4191	Twiford, L. O.	Garner
4549	Nelson, Wm	Corwith	2826	Wray, D. C.	Britt
5003	Osika, W. O.	Corwith			

HARDIN.

4637	Alberry, W. F.	Hubbard	5227	K	J. E.	Whitten
3863	Barber, H. A.	Iowa Falls	5289	M	E.	Iowa Falls
4405	Corfe, W. H.	Union	5270	M		Ackley
4155	Cowan, J. D.	Iowa Falls	5409	M	E.	Owasa
4795	Coveny, J. F.	Eldora	3771	N		Ackley
3383	DeMarsha, F. E.	Radcliffe	4476	N		Hubbard
1316	Finster, H. J.	Steamboat Rock	4003	P		Ackley
2728	Forney, O. M.	Iowa Falls	4259	E	part.	Union
4709	Gregory, F. W.	Iowa Falls	3070	H		Iowa Falls
581	Hammond, J. H.	Eldora	4476	S		Alden
4424	Hufford, G. E.	Iowa Falls	4577	S		Hubbard
5124	Hunter, E. G.	Eldora	5607	S		Eldora
5190	Hatclstad, M. L.	Radcliffe	5228	T	J.	Union
5313	Hartman, O. P.	Eldora	5365	T	E.	Eldora
5518	Hackrodt, H. G.	Ackley	3042	W	E. E.	Eldora
4455	Johnson, Franklin	Iowa Falls	5953	W	J.	Alden
4895	Junkertman, Julius	Ackley	5345	W	E.	Eldora
5709	Koenenman, E. O.	Whitten	5455	W		Hubbard
4404	Kent, O. W.	Iowa Falls				

HARRISON.

4123	Berkeley, S. L.	Woodbine	2671	M		Mondamin
4659	Brown, L. W.	Missouri Valley	2137	M		Missouri Valley
4763	Bracken, Z. E.	Modale	2348	O		Missouri Valley
2970	Dean, F. A.	Dunlap	5027	P		Logan
1710	Ellis, O. K.	Little Sioux	2254	E		Woodbine
2479	Ellor, S.	Missouri Valley	496	S		Dunlap
745	Ho, W. H.	Little Sioux	475	S		Dunlap
2936	H., F. M.	Perla	333	S		Missouri Valley
4969	Harvey, B. W.	Missouri Valley	5430	S		Missouri Valley
4590	Jones, J. D.	Logan	5027	S		Logan
2828	Knecht, A. A.	Modale	4377	T		Mondamin
5015	Kennedy, O. S.	Logan				

HAMILTON.

2945	Arthur, H. J.	Webster City	4167	Hamaker, G. E.	Stanhope
5235	Bale, G. W.	Webster City	4801	Keltz, B. F.	Webster City
5896	Busby, E. E.	Webster City	2391	Little, M. A.	Webster City
3650	Cole, Victor F.	Jewel Junction	2001	Medberg, J. M.	Webster City
4733	Crosley, Mont.	Randall	4395	Madsen, M. P.	Jewel
5538	Douglas, Mary V.	Blairsburg	5023	Newman, Orace	Webster City
2658	Elch, J. F.	Stratford	1909	Peterson, P. O.	Stratford
2914	Fidler, J. D.	Williamns	5223	Ruegnitz, Fred	Stratford
5723	French, O. B.	Webster City	4987	Schultz, W. B.	Williamns
2336	Griffith, J. O.	Ellsworth	1261	Teed, W. W.	Webster City
2724	Gerber, L. M.	Webster City	4473	Torrencia, J. D.	Kanmar
279	Greiner, L. F.	Webster City	76	Walgamot, A. B.	Webster City
2900	Holebrook, G. A.	Webster City			

HENRY.

833 Arnold, O. V.	Mt. Pleasant	8394 Lindley, J. M.	Winfield
4094 Bosworth, A. H.	Mt. Pleasant	5415 Meyer, H. O.	Wayland
4073 Crew, A. S.	Salem	5482 Nixon, R. B.	Mt. Union
4429 Coppock, Wood.	Mt. Pleasant	3837 Ott, J. R.	Mt. Pleasant
4593 Carse, G. H.	Winfield	5576 Ott, C. A.	Mt. Pleasant
4562 Drummond, O. M.	Mt. Pleasant	837 Pyle, S. M.	Mt. Pleasant
1819 Hanna, J. W.	Winfield	2156 Pierce, G. B.	Salem
3165 Huston, J. E.	Winfield	3804 Rouse, C. H.	Salem
4298 Holland, J. E.	Mt. Pleasant	5043 Rouse, C. O.	Salem
5722 Hoover, J. W.	Mt. Pleasant	5031 Smutz, W. A.	Hillsboro
3292 Jericho, J. H.	Mt. Pleasant	5550 Sheppard, S. H.	Mt. Pleasant
5703 Jericho, Albert.	Mt. Pleasant	827 Van Olse, I. P.	Mt. Pleasant
882 Lyon, Smith.	Mt. Pleasant	3592 Van Ausdale, G. M.	New London
1320 Lindley, B. B.	Winfield	4622 Williams, A. H.	Mt. Pleasant

HOWARD.

5648 Adam, W. O.	Elma	4903 Kissel, Geo.	Oresco
1491 Clemmer, J. J.	Oresco	1954 Lowery, J. J.	Oresco
2949 Connolly, Wm.	Oresco	4619 Luera, J. H.	Oresco
3819 Connolly, J. P.	Oresco	4677 Love, J. G.	Lime Springs
4556 Clemmer, P. D.	Oresco	4869 Lowery, F. B.	Oresco
3956 Dayton, O. D.	Lime Springs	5481 Lomak, E. T.	Oresco
4877 Davies, W. T. T.	Elma	5196 Milz, W. F.	Oresco
5496 Dayton, Lizzie A.	Lime Springs	3599 Overfield, E. E.	Elma
4887 Eckstein, E. J.	Chester	4627 Reed, J. W.	Lime Springs
3861 Jackson, G. H.	Oresco	2357 Van Leuven, G. M., Jr.	Lime Springs

HUMBOLDT.

4594 Atzen, Chas. B.	Thor	5038 Hibner, Chas., Jr.	Gilmore City
5157 Arent, A. L., Jr.	Rutland	3611 Koontz, J. F.	Humboldt
4308 Cole, H. B.	Renwick	2143 McElwaine, R. H.	Hardy
4624 Cole, Mrs. Ella O.	Renwick	2959 McFarland, A. W.	Dakota City
4927 Conner, Edw. E.	Livermore	5506 McNamara, F. H.	Humboldt
3199 Doan, H. C.	Humboldt	5049 Preble, Chas. H.	Humboldt
5126 Demaray, O. H.	Livermore	3768 Russ, A. E.	Humboldt
4115 Gaugestad, L. M.	Bode	4908 Smith, Roy B.	Bradgate
3126 Hubbard, H. O.	Humboldt	5153 Vohs, G. L.	Ottosen
4891 Hack, Leon.	Livermore		

IDA.

2567 Bilby, A. M.	Galva	3947 Miller, Chas. I.	Galva
3303 Bronson, E. O.	Battle Creek	2814 Simons, A. O.	Ida Grove
3034 Farnsworth, D. W.	Galva	3014 Somers, J. W.	Ida Grove
2389 Johnson, Barnett.	Ida Grove	5445 Sylvester, V. W.	Battle Creek
4730 Kiner, F. O.	Ida Grove	3262 Walker, J. T.	Holstein
4759 Loucks, J. C.	Ida Grove	3820 Wilson, C. L.	Holstein

IOWA.

3666 Alt, G. W.	Williamsburg	3313 Hass, Fred.	Marengo
3441 Bosley, J. E.	Ladora	5521 Jayne, Edwin.	Williamsburg
3715 Burns, W. A.	Millersburg	5190 Koch, A. F.	Middle Amana
3781 Brown, L. E.	Parnell	2373 Nicol, Ira I.	North English
5380 Cook, Roy L.	North English	2737 Pentzer, J. L.	Williamsburg
500 Eddy, W. M.	Marengo	4993 Perry, T. J.	Millersburg
1681 Fletcher, W. G.	Williamsburg	4773 Ross, N. K.	Victor
3580 Foster, T. M.	North English	1797 Schadt, Conrad.	Amana
3620 Goldthwait, T. O.	Marengo	2694 Schnell, T. J.	Parnell
5133 Gwinn, E. H.	Victor	5261 Schulte, J. F.	Victor

JACKSON.

4587 Ahlers, O. U.	Andrew	1773 Hubbard, L. W.	Monmouth
4700 Avery, A. M.	Maquoketa	4129 Hintzen, N. J.	La Motte
2189 Belden, M. J.	Canton	4848 Hanske, Ed. A.	Bellevue
3703 Butterworth, H. O.	Maquoketa	2800 Jenkins, Hugh.	Preston
4546 Brown, E. F.	Maquoketa	4669 Kranz, G. F.	Bellevue
4843 Broxam, A. L.	Maquoketa	5503 Kegler, J. J.	Spring Brook
5223 Brown, J. H.	Rosemond	2632 Loose, D. N.	Maquoketa
5147 Cantwell, J. Y.	Maquoketa	5316 Lentz, Wm. L.	Bellevue
205 Dierkes, Chas.	Bellevue	2953 McCormick, F. M.	Baldwin
4981 Daugherty, A. E.	Monmouth	4453 McCormick, W. A.	Miles
5289 Daudel, H. A.	Andrew	2556 Nitzsche, J. O.	Maquoketa
5586 Dierkes, Frederick, Jr.	Bellevue	861 Orcutt, G. B.	Maquoketa
1234 Eldridge, O. G.	Sabula	206 Rolling, John.	Bellevue
1285 Guenther, J. H.	Sabula	4182 Young, C. O.	Maquoketa

JASPER.

2695 Birchard, Rufus.....Kellogg	823 Farmer, E. F.....Newton
5102 Burt, O. A.....Colfax	1153 Quire, O. E.....Newton
4810 Conrad, C. S.....Prairie City	2280 Ryan, J. B.....Colfax
1487 Dalrymple, A. L.....Monroe	3148 Eddle, N. D.....Prairie City
4012 Downs, H. S.....Baxter	4628 Eddle, O. H.....Prairie City
5831 Elliott, Alexander.....Mingo	981 Skiff, H. J.....Newton
2210 Freeman, J. H.....Prairie City	978 Smith, J. B.....Kellogg
4374 Fowler, L. E.....Lynnville	3789 Shea, J. W.....Colfax
4737 Foster, W. C.....Newton	5827 Spaul, R. T.....Newton
5638 Forney, O. M.....Valeria	4422 Shaw, F. W.....Monroe
3049 Graham, O. C.....Baxter	1004 Thompson, J. O.....Newton
4134 Hindorf, A. E.....Newton	3124 Trotter, W. E.....Valeria
1897 Jones, G. W.....Colfax	2058 Turner, L. C. S.....Colfax
4077 Johnson, F. W.....Prairie City	4890 Tabler, E. F.....Colfax
3408 Kennedy, A. L.....Newton	3901 Wagley, O. N.....Newton
5282 Lane, F. S.....Monroe	4330 Weirick, H. A.....Colfax
5438 Lear, G. W.....Monroe	4398 Westbrook, Burr.....Newton
5247 Margula, F. A.....Colfax	5110 Weirick, C. J.....Colfax
5724 McKay, O. B.....Monroe	5128 Wanberg, G. E.....Baxter
5783 Nollen, J. H.....Monroe	5877 Wilson, O. N.....Monroe

JEFFERSON.

587 C.....Fairfield	4885 Marsh, W. K.....Batavia
8893 C.....Fairfield	1509 Peters, H. C.....Fairfield
4726 C.....Libertyville	8238 Peterson, W. J.....Fairfield
5134 C.....Fairfield	2151 Sister, W. O.....Fairfield
308 H.....Batavia	4514 Shriner, F. S.....Fairfield
586 H.....Fairfield	1708 Thoma, Louis.....Fairfield
1053 M.....Pleasant Plains	5898 Thoma, S. E.....Fairfield
4516 M.....Fairfield	

JOHNSON.

2593 Anderson, L. R.....Oxford	2757 L.....Iowa City
316 Boerner, E. W.....Iowa City	4879 L.....ed Ruth.....Iowa City
5123 Boerner, F. A.....Iowa City	4823 M.....Iowa City
2876 Boerner, E. L.....Iowa City	5070 M.....Iowa City
4004 Boschnagle, Frank.....Lone Tree	3898 N.....Iowa City
5141 Beaman, S. Alcinda.....Iowa City	5828 N.....Iowa City
5218 Brees, J. W.....Iowa City	1906 R.....Oxford
5485 Buss, F. J.....Iowa City	4731 R.....Lone Tree
5053 Benham, L. A.....Iowa City	731 R.....Iowa City
1023 Doty, E. A.....Oxford	2288 R.....O.....Iowa City
1903 Davis, M. W.....Iowa City	3770 T.....Iowa City
4894 Delaney, J. C.....Iowa City	1501 W.....Iowa City
2312 Foltz, G. F.....Iowa City	4297 W.....Oxford
5130 Graft, W. H.....Iowa City	5894 W.....Iowa City
2603 Hofer, A. E.....Solon	

JONES.

841 Backer, J. H.....Monticello	4487 Ormsby, F. E.....Martelle
1284 Babcock, E. M.....Wyoming	844 Putnam, R. A.....Monticello
5153 Brock, W. B.....Olin	2678 Port, F. W.....Olin
5306 Brown, W. E.....Anamosa	275 Skinner, W. B.....Anamosa
5879 Dorgshoh, H.....Anamosa	377 Skinner, Mary A.....Anamosa
5043 Freisinger, Joseph.....Oxford Junction	4178 Sigworth, D. B.....Anamosa
3208 Grimwood, A. E.....Oxford Junction	4298 Soetje, O. H.....Monticello
3173 Howard, C. R.....Anamosa	5455 Sigworth, M. P., Jr.....Anamosa
4633 Holt, Ed S.....Anamosa	1943 Tarks, Herman.....Monticello
845 Kempf, A. H.....Monticello	5185 Thomas, F. H.....Wyoming
4878 Mackrill, W. A.....Onslow	5193 Tisdale, W. H.....Olin

KEOKUK.

3504 Allison, S. M.....Nassau	3170 M.....Olin
3113 Cameron, I. F.....Keosauk	5176 M.....Webster
2651 Coffman, W. T.....South English	5124 P.....What Cheer
5893 Campbell, E. C.....Martinsburg	3953 R.....Richland
5097 Connolly, F. L.....Hedrick	2127 S.....Richland
5048 Cameron, Mabel.....Keosauk	4267 S.....Thornburg
5123 Corwin, J. W.....Kinross	4053 S.....Sigourney
697 Eaton, J. E.....Keota	5235 S.....Harper
2469 Engeldinger, Peter.....Hedrick	5201 T.....Keota
4190 Eastburn, W. W.....Hedrick	5285 U.....What Cheer
3043 Franken, Edw.....Sigourney	977 V.....Harper
5746 Ford, John.....What Cheer	5073 V.....Keota
136 Griffith, J. A.....What Cheer	3925 W.....What Cheer
57 Himrod, Mrs. D. M.....What Cheer	2726 W.....Hedrick
27 Holmes, W. L.....Keota	4087 W.....What Cheer
4741 Hamilton, R. C.....Keota	4470 W.....Sigourney
5619 Jenkins, W. J.....Thornburg	4824 W.....Sigourney
2617 Mitchell, A. F.....Delta	

COMMISSIONERS OF PHARMACY.

ROSSUTS.

3794 Anderson, Ollie H.....	Wesley	3797 Lacy, George.....	Luverne
4080 Anderson, E. O.....	Bancroft	4522 Little, O. A.....	Barton
5140 Adams, H. O.....	Algona	4898 Lien, A. E.....	Whittemore
5490 Anderson, O. E.....	Swes City	5015 Louder, William.....	Ledyard
2224 Butts, F. M.....	Wesley	5295 Lohse, H. W.....	Algona
2940 Berryman, A. J.....	Bancroft	4010 Miller, R. H.....	Algona
4791 Bleich, H. E.....	Ledyard	5253 Murray, W. E.....	Burt
4505 Cronk, A. P.....	Bancroft	5701 Moore, H. N.....	Algona
950 Durant, A. H.....	Algona	5441 Rogers, R. E.....	Algona
950 Durant, H.....	Algona	5398 Studley, W. J.....	Algona
3781 Dingley, F. W.....	Algona	4023 Stone, N. E.....	Swes City
5375 Eigler, F. H.....	Fenton	5254 Specht, A. B.....	Titonka
4500 Falkenhaimer, A. L.....	Titonka	5515 Stahl, S. E.....	Bancroft
4316 Groneman, F. O.....	Whittemore	5051 Tias, G. I.....	Luverne
5428 Graves, O. L.....	Ledyard	5551 Varuum, Ray.....	Burt
3090 Hall, Lincoln.....	Burt	4897 Walters, O. M. O.....	Bancroft
4084 Heal, Frank.....	Wesley	5171 Watters, D. J.....	Germania

LEE.

1687 Art, J. H.....	4415 L.....
428 Blackinton, W. N.....	5075 L.....
2907 Burlingham, E. H.....	595 M.....
5513 Bowen, O. A.....	3906 O.....
2172 Camp, E. R.....	121 P.....
4803 Cilley, W. W.....	113 R.....
5516 Outier, O. C.....	H.....
5306 Englehardt, O. P.....	1720 R.....
143 Fuller, O. M.....	4131 R.....
5512 Gott, E. S.....	736 Si.....
1724 Heiser, Rudolph.....	1546 Si.....
1576 Ingalls, J. E.....	1940 W.....
583 Kerr, D. A.....	3765 S.....
591 Kiedalsch, F. J.....	4165 S.....
3088 Kiedalsch, J. F., Jr.....	4910 S.....
5313 Kasten, W. O.....	1851 T.....
4086 Lampe, T. J.....	

LINN.

2695 A.....	3773 Lillis, L. M.....	Marion
2501 A.....	5037 Lee, T. M.....	Lisbon
791 B.....	3717 Mator, J. B.....	Cedar Rapids
1254 B.....	5490 Moment, E. F.....	Walker
4084 B.....	5897 Munn, J. W.....	Cosgon
4535 B.....	5074 Mittvalsky, E. O.....	Cedar Rapids
4935 B.....	5198 Nistert, W. G.....	Alburnett
5404 B.....	3887 Owin, O. M.....	Marion
4910 O.....	3655 Owin, L. P.....	Marion
3784 O.....	3884 Pitkin, F. O.....	Cedar Rapids
4453 O.....	4578 Ryan, O. D.....	Cedar Rapids
4708 O.....	5272 Richards, W. W.....	Cedar Rapids
340 D.....	1855 Sommerbeck, E.....	Cedar Rapids
2697 D.....	3759 Svacha, Frank.....	Ely
4044 E.....	3205 Severa, W. F.....	Cedar Rapids
1551 F.....	3340 Schminko, F. C. H.....	Marion
1799 F.....	4420 Shomier, O. E.....	Cedar Rapids
5984 F.....	4457 Swan, A. B.....	Walker
4040 G.....	4685 Sargent, F. L.....	Marion
795 H.....	4840 Skvor, J. M.....	Cedar Rapids
2655 H.....	498 Trueblood, John.....	Central City
3990 H.....	4795 Trueblood, W. A.....	Central City
3908 H.....	5074 Voamek, J. H.....	Cedar Rapids
4359 H.....	411 Wilson, L. L.....	Center Point
4748 H.....	511 Weller, W. L.....	Cedar Rapids
5273 H.....	1777 Wright, G. J.....	Waukeek
4535 Jo.....	2641 Ward, Perry.....	Central City
5112 Jo.....	3885 Wilson, J. B.....	Marion
154 K.....	4559 Whelihan, J. F.....	Cedar Rapids
3099 L.....		

LOUISA.

4241 Brown, H. L.....	Columbus Junction	5671 Kerr, F. E.....	Letts
4785 Brown, J. W.....	Oakville	1888 Plitt, H. A.....	Wapello
5347 Blanchard, H. E.....	Wapello	4738 Robertson, Samuel.....	Columbus Jct.
5535 Brown, W. T.....	Columbus Junction	4237 Salmon, G. A.....	Columbus Junction
2189 Cochran, W. H.....	Morning Sun	5885 Shipman, O. V.....	Columbus Junction
5295 Curran, W. D.....	Morning Sun	5676 Swan, W. O.....	Morning Sun
4745 Glipple, L. U.....	Letts	3763 Thompson, A. O.....	Wapello
3906 Hendrix, N. T.....	Columbus Junction	5847 Waugh, H. T.....	Wapello

LUCAS.

2385 Briles, W. R.	Chariton	128 Newell, W. M.	Russell
917 Duon, J. W.	Derby	1084 Sprague, J. F.	Russell
5264 Dougherty, B. E.	Chariton	1119 Storie, D. Q.	Chariton
2655 Jones, E. S.	Chariton	2434 Stover, N. W.	Lucas
3799 John, G. W.	Lucas	8376 Werts, J. L.	Russell
2333 Kirk, C. E.	Chariton	4216 Whitlock, O. E.	Chariton

LYON.

4729 Amasberry, A. L.	Lester	3864 Jones Rowland.	Lester
3880 Brink, H. J.	Doon	6617 Johnson, A. L.	Larchwood
4963 Bradshaw, S. M.	George	4556 Kaplan, J. G.	Rock Rapids
5351 Calacab, J. R.	Little Rock	6668 O'Connor, T. E.	George
5679 Ooury, W. L.	Larchwood	4683 Page, W. F.	Alvord
5216 Foley, C. S.	Rock Rapids	6732 Vickers, Grant.	Inwood
3925 Gurney, O. L.	Doon	2379 Wycoff, W. O.	Rock Rapids
4622 Getman, N. E.	Larchwood	4670 Williams, J. R.	Larchwood
2216 Horton, F. A.	Rock Rapids	4650 Wismer, Alvin E.	George
4006 Hoff, J. A.	Doon		

MADISON.

3981 Anderson, E. K.	St Charles	5716 K.	Winterset
5490 Bradshaw, L. S.	Winterset	3413 P.	East Peru
3335 Catterlin, S. E.	Winterset	4379 P.	Winterset
5459 Calen, F. W.	Winterset	3867 S.	Winterset
3470 Griswold, E. B.	Winterset	4109 S.	Earlham
1785 Henshaw, John.	Winterset	4641 S.	St. Charles
4355 Hutchison, J. A.	Truro	3416 T.	Winterset
4906 Henry, W. J.	Winterset	1368 W.	St. Charles
6760 Horn, C. C.	Winterset		

MAHASKA.

4996 Armour, F. C.	Oskaloosa	2434 Hinton, G. A.	Oskaloosa
315 Beardsley, William	Beacon	2640 Henderson, J. B.	Muchakinock
1043 Beechler, G. N.	Oskaloosa	3175 Johnson, Alfred.	Given
1856 Bentley, N. J.	Oskaloosa	4249 Kramme, H. W.	Barnes City
4146 Blakeslee, J. H.	Oskaloosa	5423 Knudson, A. O.	Oskaloosa
4188 B.	Rose Hill	1036 Morgan, J. W.	Oskaloosa
4215 B.	Oskaloosa	3031 Nugent, H. D.	Oskaloosa
4444 B.	Oskaloosa	4121 Noel, J. F.	Muchakinock
5338 B.	Oskaloosa	2756 Pickett, J. H.	Oskaloosa
1489 C.	Oskaloosa	3940 Pike, O. O.	Oskaloosa
3710 C.	Muchakinock	1997 Reel, Z. T.	Oskaloosa
4495 C.	O. E.	2068 Reel, A. E.	Oskaloosa
4397 D.	Fremont	3368 Thomas, J. C.	Muchakinock
4929 D.	New Sharon	4839 Vickers, Will.	New Sharon
5273 D.	sa B.	3650 Wray, J. W.	Oskaloosa
2452 G.	Oskaloosa		

MARION.

249 Allen, W. L.	Pella	544 Kirkwood, J. W.	Otley
1417 Brinkerhoff, F. W.	Pella	1170 Keables, B. F.	Pella
2519 Bare, O. H.	Pleasantville	1171 Keables, J. B.	Pella
2880 Brinkerhoff, C. W.	Pella	1973 Keables, H. S.	Pella
493 Cole, T. R.	Marysville	5450 Keables, H. F.	Pella
4776 Criddick, W. W.	Knoxville	1051 Litchfield, A. N.	Pleasantville
4829 Cloc, J. W.	Knoxville	5187 Lyon, Charles.	Pleasantville
5470 Dornet, A. L.	Marysville	4061 Park, L. S.	Tracy
2123 Elliott, W. V.	Knoxville	4986 Ritchie, J. W.	Dallas
1068 Forsythe, W. D.	Pella	675 Woodruff, M. W.	Knoxville
5372 Gamble, O. A.	Knoxville	2745 Wright, L. D.	Knoxville
5004 Hollowell, J. E.	Swan	5005 Wagenaar, E. O.	Pella
543 Kirkwood, T. J.	Otley		

MARSHALL.

5029 Alexander, J. M.	Marshalltown	3619 Merahon, G. A.	Liscomb
1161 Brimhall, S. M.	State Center	4533 Maytag, T. H.	Laurel
1232 Bishop, E. W.	State Center	4703 McDonald, J. E.	Marshalltown
2880 Brimhall, W. F.	State Center	4124 Newman, C. T.	St. Anthony
5434 Bartholow, E. L.	Olemons	6677 Nichols, F. E.	State Center
5463 Batty, Alfred.	Marshalltown	1161 Powers, G. P.	Marshalltown
4258 Dunkle, W. B.	Gilman	2435 Plumb, W. T.	Van Cleave
4268 Dobson, Mrs. M. H.	Le Grande	5334 Porter, G. E.	Marshalltown
4070 Elder, A. T.	Marshalltown	3617 Sieg, H. C.	Marshalltown
4153 Evans, W. H.	Marshalltown	2928 Seeley, C. A.	Marshalltown
5111 Everette, Orion.	Marshalltown	3933 Smith, M. R.	Laurel
1285 Frost, O. E.	Rhoades	4163 Stone, C. F. M.	Marshalltown

MARSHALL—CONTINUED.

4777 Garey, O. E.	Marshalltown	4448 Swift, T. C.	State Center
4788 Hoy, A. W.	Marshalltown	5000 Sorensen, Hans.	Marshalltown
5322 Hambleton, J. M.	Melbourne	606 Ward, J. A.	Gilman
1156 Lander, C. J.	Marshalltown	607 Ward, W. J.	Gilman
5113 Lander, C. J., Jr.	Marshalltown	2098 Wiley, F. B.	Marshalltown
1409 McBride, W. S.	Marshalltown	3773 Woodward, H. H.	Melbourne
2611 Mayer, Peter.	Marshalltown	4347 Woodward, Will O.	Marshalltown
2385 Morgan, B. A.	Marshalltown	4585 Will, E. O.	Marshalltown
3404 McBride, E. W.	Marshalltown		

MILLS

2614 Barlow, A. W.	Glenwood	1893 Irwin, O. W.	Henderson
4647 Bleakney, E. L.	Glenwood	3829 Leith, G. E.	Henderson
3515 Chaplin, G. O.	Hastings	1214 Moore, W. G.	Silver City
4300 Collins, E. O.	Emerson	5328 McGrew, L. W.	Emerson
2433 De Witt, C. H.	Glenwood	5351 Priest, F. H.	Emerson
595 Edwards, M. G.	Glenwood	2707 Royce, C. S.	Malvern
338 Flammant, M.	Mineola	4977 Redmond, I. D.	Pacific Junction
3711 Goodwin, F. L. B.	Malvern	564 Shipman, E. M.	Emerson
2715 Howe, A. J.	Glenwood	4526 Skillecom, W. M.	Glenwood
4909 Holtzinger, P. S.	Emerson	5023 Wilson, W. D.	Malvern

MITCHELL

1099 Amos, Albert.	Stacyville	1124 M.	St. Ansgar
4220 Ady, R. W.	Osage	4815 M.	St. Ansgar
1029 Evans, W. L.	Osage	1847 P.	McIntire
5750 Flint, E. R.	Osage	3891 R.	O.
3233 Goodall, Parr.	Osage	5490 R.	Riceville
4704 Graves, A. V.	McIntire	219 R.	Riceville
4838 Green, S. E.	Osage	3044 R.	West Mitchell
1037 Lezott, Chas. H.	Osage	5197 R.	Osage
			Riceville

MONONA.

4399 Backer, N. G.	Whiting	2025 Minthorn, M. F.	Moorehead
5405 Bigelow, B. E.	Onawa	3154 Putsler, J. H.	Mapleton
2553 Dyer, H. W.	Mapleton	32 East, David.	Whiting
4037 Felt, E. R.	Onawa	4079 Surface, D. W.	Ostana
882 Griffin, F.	Mapleton	5639 Selleck, E. O.	Onawa
4518 Griffin, O. F.	Mapleton	5397 Towers, J. J.	Whiting
2808 Mann, A. W.	Onawa	3844 Wheeler, C. H.	Blencoe

MONROE.

776 Bissell, O. E.	Lovilla	379 Morrison, Ella A.	Albia
3104 Bartram, E. T.	Albia	4563 Miller, G. D.	Albia
4182 Carden, G. R.	Albia	5223 Murray, W. P.	Melrose
4378 Johnson, D. W.	Albia	6758 McFadden, Wm.	Albia
5144 Johnson, E. R.	Monroe	971 O'Connor, J. C.	Melrose
278 Morrison, J. O.	Albia	887 Roberts, J. W.	Albia

MONTGOMERY.

121 Arts, David.	Red Oak	4197 Jones, H. F.	Red Oak
2229 Cary, G. T.	Grant	3216 Lynch, L. J.	Villisca
2356 Childs, E. W.	Villisca	4312 Luce, John.	Villisca
5555 Orriswell, J. W.	Villisca	3448 Mollenhoff, J. P.	Stanton
2345 Erricson, G. E.	Red Oak	4970 Ordway, Cora.	Elliott
593 Hinchman, A. C.	Red Oak	2343 Platt, G. M.	Red Oak
2943 Hine, O. W.	Stanton	2419 Stillians, W. A.	Villisca
2547 Hulett, A.	Red Oak	3758 Shank, H. W.	Red Oak
4981 Hully, H. D.	Elliott	5373 Shockley, Ned.	Red Oak
5394 Hinchman, C. B.	Red Oak		

MUSCATINE.

1294 Agnew, D. G.	Wilton Junction	3695 Graham, E. L.	Muscataine
3116 Busch, W. C. A.	Muscataine	2782 Hampton, E. B.	West Liberty
4174 Barkalow, W. B.	Atalissa	3110 Havercamp, J. J.	Muscataine
4350 Braumworth, Alice L.	Muscataine	2421 Henderson, E. L.	West Liberty
1450 Coaling, A. A.	Wilton Junction	4296 Hazlett, J. O.	Muscataine
3681 Cope, W. L.	Muscataine	1803 Krehe, J. T.	Muscataine
3690 Carl, F. F.	Nichols	2968 Kuchmann, J. T.	Muscataine
4764 Cope, F. O.	Wilton Junction	5680 Lang, Wm.	Muscataine
5630 Coady, J. J.	Muscataine	1841 Marolf, J. F.	Wilton Junction
888 Deutschmann, August.	Muscataine	3745 Moore, G. A.	West Liberty
1635 Daugherty, J. B.	Muscataine	4611 McBride, W. H.	Muscataine
5788 Embro, G. B.	West Liberty	5570 Miller, C. V.	West Liberty
4658 Farmer, E.	Wilton Junction	5559 Neeser, F. T.	Muscataine
5532 Fishburn, E. O.	Muscataine	1441 Reimcke, G. A.	Muscataine
867 Gels, Henry.	Muscataine	1647 Zeisig, C. A.	Moscow

O'BRIEN.

1205 A	I. L.	Sheldon	2097 P	Sutherland
4444 A	O	Sanborn	2098 P	Sutherland
4890 B	E. L.	Sheldon	2099 P	Paulina
3316 D	F. J.	Primghar	2094 E	Primghar
4885 F	F	Paulina		Sanborn
5800 G	L	Sheldon		Hartley
2840 H	J. O.	Primghar		Sanborn
5095 M	L. E.	Hartley		Sheldon
5367 M	J. A. E.	Hartley		Sheldon

OSCEOLA.

3269	Carmichael, J. H.	Ashton	1210	Lawrence, W. K.	Fibley
3432	Cook, O. A.	Ocheyedan	1236	Parker, W. L.	Fibley
5026	Carmichael, Lola.	Ashton	4512	Parker, C. E.	Sibley
1295	Giles, D. E.	Harris	3058	Stevens, W. B.	Sibley
3024	Graves, F. W.	Harris	3995	Smith, A. E.	Harris
2910	Hamilton, E. G.	Ocheyedan			

PAGE.

322	Burrows, J. P.	Olarinda	1706	L	Olarinda
360	Bagnall, J. L.	College Springs	5555	L	Braddyville
2918	Benge, A. T.	Humeston	5431	M	Blanchard
4149	Blair, F. L.	Olarinda	5453	N	College Springs
4281	Eaton, H. E.	Knox	3004	N	Knox
4173	Gause, M.	Coln	2918	P	Shenandoah
3461	Hite, E. B.	Olarinda	5418	P	Olarinda
2950	Henderson, W. A.	Olarinda	5387	Q	Knox
4018	Hunt, A. V.	Olarinda	3553	R	Coln
3045	Jay, George.	Shenandoah	4890	R	Olarinda
795	Johnson, O. J.	Olarinda	579	V	Olarinda
4933	Jeffrey, F. D.	Olarinda	1241	V	Shenandoah
5454	Jackson, T. O.	Shenandoah	5453	V	Olarinda
3005	Keeran, J. B.	Blanchard			

PAJO LEWIS.

4268	Anderson, J. H.	Ruthven	3807	H	Emmetsburg
3444	Ankema, S. E.	Emmetsburg	5364	H	Ruthven
1893	Burns, J. O.	Emmetsburg	3350	H	Emmetsburg
2497	Bachman, E. W.	West Bend	3750	B	Emmetsburg
4553	Barrett, W. H.	Mallard	535	V	Emmetsburg
2380	Babcock, H. M.	Ruthven	4914	V	Carlew
2071	Cuplin, P. P.	West Bend	4708	V	Ruthven
4813	Ooflin, T. D.	Graettinger	4930	V	Ruthven
3018	Easton, E. K.	West Bend			

PLYMOUTH.

4421 B	M.	Le Mars	4344	Nigg, H. A.	Merrill
214 C	e.	Le Mars	5090	Parker, G. F.	Le Mars
9795 O		Akron	4908	Rippey, J. H.	Kingsley
380 D		Le Mars	4144	Sartori, Anton.	Le Mars
5059 K		Le Mars	4972	Spotts, S. W.	Le Mars
4478 L		Bemsen	4973	Schoofs, J. J.	Bemsen
3860 M		Bemsen	5360	Strubbe, A. J.	Akron
4144 M		Struble	2632	Wilger, J. J.	Kingsley
4184 M		Akron	2393	Wilson, C. W.	Kingsley
5014 M	allace.	Le Mars	2643	Wilson, L. E.	Akron
5022 M		Akron	5603	Welch, A. E.	Kingsley
5394 M	H	Le Mars	5734	Wernli, L. S.	Le Mars

POCAHONTAS.

5121	Anderson, E. A.	Fonda	4234	Hughes, E. E.	Laurens
265	Brenton, A. G.	Plover	5294	Henning, A. F.	
3413	Bollard, J. B.	Fonda	2397	Jones, S. U.	Pocahontas
3817	Beam, C. H.	Boile	5562	Kniest, L. E.	Boile
1670	Carroll, J. M.	Laurens	4871	McMannus, F. W.	Gilmore City
3188	Cole, G. W.	Boile	3866	Patty, O. C.	Fonda
4323	Colgan, F. L.	Boile	4487	Reed, O. G.	Laurens
5425	Cone, E. K.	Fonda	3377	Sheldon, J. B.	Havelock
4945	Day, G. W.	Plover	4781	Thomer, M. L.	Gilmore City
2308	England, L. E.	Gilmore City	2843	Webb, O. M.	Boile
4715	Freeman, F. E.	Pocahontas	2803	Wiewel, Joseph.	Boile
2464	Giggins, J. W.	Laurens			

COMMISSIONERS OF PHARMACY.

108

POLE.

4943 Aldrich, F. S.	Des Moines	5981 Miles, A. H.	
5796 Allen, D. A.	Des Moines	5978 McKay, F. P.	
1729 Backer, C. W.	Des Moines	2443 Mahanke, George	
2401 Begun, O. A.		4350 McArthur, F. H.	
3497 Bernard, O. G.		4483 McCurnin, T. P.	
4311 Bauser, J. A.		4448 McKay, O. A.	
4575 Barnett, J. M.		4557 McConaughy, E. E.	
5335 Bradish, W. O.		4346 Miles, C. C.	
5707 Bascomb, F. W.		5985 McCombs, Amantus	
1399 Chamberlain, Lowell.		5743 Manning, E. D.	
2334 Cogswell, S. G.		3188 Norton, O. F.	
3953 Cox, G. W.		3995 Namur, Charles	
4288 Cowles, V. D.		4084 Nelson, O. B.	
4598 Conklin, W. S.		5313 Nesting, O. O.	
4684 Carpenter, F. F.		5643 Nordgren, E. J.	
5154 Coon, L. B.		3107 Olsen, M. J.	
5717 Chamberlain, L. H.		3486 Odiorne, E. G.	
1999 Duke, C. D.		491 Parker, J. H.	
3791 Durette, R. G.		4280 Pierson, L. E.	
4337 Davis, F. R.		5344 Parr, D. E.	
4597 Delander, O. A.		5590 Pickerill, J. B.	
5986 Durette, Ella B.		3397 Petree, J. E.	
1445 Eulich, T. B.		183 Bogg, C. W.	
2345 Eaton, F. N.	V	497 Randolph, J. W.	
3748 Engleau, C. J.		302 Reichard, D. H.	
4199 Eade, J. W.		3956 Randall, O. T.	
5168 Fernay, J. L.		3946 Randolph, Frank	
5745 Fuller, Anna C.		3294 Riggs, J. A.	
1974 Givens, O. E.		3544 Rogers, E. E.	
3954 Graff, J. E.		4083 Reichard, W. F.	
4126 Gibson, R. M.		4550 Rehkopf, A. H.	
4189 Graham, W. A.		5435 Rixline, A. J.	
5294 Gallegly, H. A.		1126 Schroeder, Frederick	
5405 Guth, T. J.		1129 Sandholm, John	
481 Hippee, Warren		1065 Souers, Webb	
1130 Huegle, H. W.		1713 Schmucker, D. E.	
1518 Hansen, H. O.		3015 Shaffer, Lewis	
1997 Harlan, C. E.		3120 Spaulding, S. J.	
1999 Hammer, Alfred		2431 Shope, E. D.	
2943 Hammer, A. G.		2743 Stewart, W. J.	
3974 Horaman, U. O.		3944 Schmidt, Louis	
3774 Huford, W. F.		3990 Stream, Curtis	
4013 Homann, Richard		3744 Stewart, Ella A.	
4143 Henry, W. P.		3995 Sheldon, Frank	
4499 Hurlbut, J. R.		3997 Shaffer, W. B.	
4490 Harrod, H. B.		3998 Shupe, C. O.	
5168 Hensch, Harry H.		4075 Stroud, J. S.	
5235 Hulse, E. E.		4263 Smith, R. H.	
5294 Higgins, E. A.		4315 Seyfert, H. L.	
5997 Halden, W. R.		5471 Smith, F. L.	
3998 Irwin, W. P.	V	5630 Smith, Channing	
497 James, E. L.		5635 Severin, J. O.	
2355 Johnson, J. A.		4905 Talbot, Thomas	
3939 Johnson, Aaron		5339 Twinley, E. LeRoy	
4199 Johnson, A. O.		5990 Thompson, E. T.	
4907 Kinyon, O. P.		4553 Veatch, E. S.	
5728 Kilgore, W. B.		581 Wood, Annie L.	
732 Lichty, Norman	Des Moines	1682 Wells, W. O.	
1713 Loper, J. O.	Des Moines	3188 Whitney, E. F.	
3010 Loper, J. H.	Des Moines	3954 Woodman, J. W.	
2999 Lawrence, E. C.	Des Moines	3411 Wood, Frank	
3931 Lawrence, E. S.	Des Moines	3940 Waterbury, F. O.	

POTTAWATTAMIE.

233 Atkins, J. B.	Council Bluffs	237 Johnson, Ella S.	Carson
3317 Andrews, J. J.	Council Bluffs	2316 Kettlewell, Chas. L.	Carson
1535 Bruce, O. M.	Walnut	2906 Lenocker, A. A.	Oakland
3132 Brown, E. O.	Council Bluffs	4573 Lehman, Max	Minden
3153 Brown, O. H.	Council Bluffs	5511 Letson, G. A.	Council Bluffs
3566 Connor, A. F.	Avoca	2974 Morgan, Dell G.	Council Bluffs
2740 Camp, J. W.	Council Bluffs	3185 Maxwell, W. J.	Avoca
3784 Camp, G. F.	Council Bluffs	4171 Mudge, L. G.	Council Bluffs
5954 Campbell, LeRoy	Council Bluffs	4637 McElroy, E. K.	Ayrshire
5670 Cash, W. F.	Underwood	4687 Morgan, F. H.	Council Bluffs
1658 De Haven, J. C.	Council Bluffs	4779 Massenburg, Lou	Council Bluffs
3997 Davis, G. S.	Council Bluffs	5109 O'Leary, Mike	Oakland
5932 Dabney, N. J.	Oakland	4323 Robbins, F.	Neola
5767 Doolittle, H. M.	Carson	4445 Rolfe, Herman	Neola
5731 Fletcher, G. W.	Council Bluffs	1682 Stuart, J. D.	Council Bluffs
3979 Gardner, W. W.	Avoca	3125 Stemple, G. L.	Macedonia

POTTAWATTAMIE—CONTINUED.

240 H	.....Council Bluffs	3554 Sellers, F. E.	.....Council Bluffs
2680 H	.....Neola	4018 Swann, C. P.	.....Oakland
3578 H	.....Council Bluffs	4437 Smart, E. G.	.....Hancock
3712 H	.....Council Bluffs	4827 Spaulding, Joe	.....Council Bluffs
4948 H	.....Council Bluffs	2474 Thompson, E. O.	.....Walnut
4996 H	.....Macedonia	3885 Whaley, S. E.	.....Council Bluffs
5910 H	.....Oakland	3892 Wyland, A. O.	.....Underwood
5704 H	.....Council Bluffs	4140 Walters, J. H.	.....Avoca
236 Jc	.....Carson	4431 Weener, F. W.	.....Council Bluffs

POWESHIEK.

5113 Alley, C. E.	.....Grinnell	5484 Prader, D. O.	.....Monticello
6143 Beard, E. L.	.....Grinnell	1182 Quira, J. O.	.....Searsboro
2538 Cutter, O. F.	.....Deep River	2842 Kainsburg, A. P.	.....Brooklyn
6085 Davis, Ella	.....Malcom	3008 Roe, C. P.	.....Grinnell
3505 Griffin, C. J.	.....Montezuma	4680 Rainsburg, C. T.	.....Brooklyn
3357 Hedges, T. M.	.....Grinnell	3271 Komaine, Ernest	.....Grinnell
5153 Hedges, Grace L.	.....Grinnell	5443 Rodgers, J. G.	.....Montezuma
5601 Hubbert, F. P.	.....Malcom	2618 Shrader, F. P.	.....Brooklyn
680 Johnson, J. G.	.....Grinnell	2391 Sanders, J. O.	.....Deep River
3001 McDonnell, P. G.	.....Grinnell	5305 Shields, W. M.	.....Montezuma
1118 Ormiston, J. S.	.....Hartwick	4360 Talbot, A. D.	.....Brooklyn
4386 Platt, J. H.	.....Montezuma	4170 Winchell, J. E.	.....Malcom

RINGGOLD.

3129 Asbury, T. P.	.....Tingley	4973 House, J. G.	.....Knowlton
4673 Armitage, A. C.	.....Ellston	3572 Jones, T. B.	.....Beaconsfield
5390 Asbury, J. W.	.....Mt. Ayr	4357 Jessup, A. E.	.....Oakdale
5408 Armitage, Daisy Dean	.....Ellston	3084 Merrill, John T.	.....Mt. Ayr
708 Camp, Marshall	.....Kellerton	4941 McElanahan, W. A.	.....Redding
4948 Cupila, H. S.	.....Kellerton	5787 O'Connor, T. G.	.....Maloy
4114 Elder, W. E.	.....Tingley	4401 Reed, H. J. O.	.....Diagonal
470 Elder, Alice Waugh	.....Tingley	5359 Seaton, S. H.	.....Delphos
911 Horne, John	.....Mt. Ayr		

SCOTT.

2 Binford, Edmund	.....Dixon	4041 Harrison, J. H.	.....Davenport
449 Ballard, J. W.	.....Davenport	436 Kemmerer, O. P.	.....Eldridge
781 Busch, T. H.	.....Davenport	440 Koch, P. T.	.....Davenport
4263 Braunlich, H. G.	.....Davenport	2623 Koechert, P. H.	.....Davenport
4947 Ballard, H. W.	.....Davenport	3799 Kistanmacher, E. J.	.....Davenport
5630 Bitner, O. W.	.....Le Claire	4116 Koch, Francis J.	.....Davenport
1008 Clark, E. A.	.....Princeton	4712 Klantz, J. E.	.....Davenport
3647 Chase, C. V.	.....Davenport	5711 Kurmoier, J. P.	.....Davenport
4261 Campbell, L. E.	.....Davenport	5715 Kegel, Karl	.....Walcott
4429 Carlisle, G. M.	.....Buffalo	5388 Lafrons, H. T.	.....Davenport
5489 Carstens, L. P.	.....Davenport	535 Meisner, Amilia	.....Davenport
3900 Driscoll, J. E.	.....Davenport	3901 Moritz, E. A.	.....Davenport
4207 Doyle, W. S.	.....Davenport	4947 M. flat, J. H.	.....Davenport
4275 Dorgan, J. J.	.....Davenport	3950 Nadler, Frank	.....Davenport
4495 Danquard, Theodore	.....Davenport	1895 Niepe, A. C. H. E.	.....Davenport
443 Emela, H. A.	.....Davenport	447 Nchlegel, Gustav	.....Davenport
470 Harrison, O. E.	.....Davenport	2307 Schlegel, C. E.	.....Davenport

SHELBY.

4938 Arrasmith, P. L.	.....Shelby	4931 Gregerson, James	.....Harlan
4978 Arnold, W. B.	.....Kirkman	4083 Jones, L. H.	.....Shelby
2684 Branson, W. S.	.....Irwin	3944 Milla, J. S.	.....Harlan
8074 Berringer, W. J.	.....Defiance	5241 Pedersen, G. M.	.....Harlan
3880 Berry, A. S.	.....Panama	5576 Reed, O. T.	.....Portsmouth
681 Frost, L. D.	.....Harlan	4137 Strunk, H. J.	.....Erling
1216 Fagan, H. M.	.....Shelby	8126 Starr, G. A.	.....Portsmouth
1368 Fretz, Menzo	.....Harlan		

SIOUX.

2653 Brush, G. W.	.....Sioux Center	4503 F	.....Rock Valley
2533 Brewer, J. H.	.....Hawarden	2578 M	.....Rock Valley
3491 Brink, Milber	.....Boyd	4651 M	.....Ireton
5532 Claesser, W. A.	.....Hawarden	2835 F	.....Rock Valley
8919 Chadwick, J. A.	.....Hospers	4384 F	.....Ireton
4263 Coad, J. A.	.....Hull	4635 F	.....Hawarden
610 Culyer, E. R.	.....Matlock	4601 F	.....Ireton
4227 Coad, N. G. O.	.....Hull	2796 E	.....Chaseworth
2661 Douglass, O. W.	.....Hawarden	3143 S	.....Sioux Center
2623 De Kruij, P. J.	.....Orange City	4638 S	.....Alton
3456 Geselschap, A. F.	.....Orange City	5425 L	.....Hawarden
4993 Grady, M. J.	.....Hawarden	4663 V	.....Granville
1615 Harlan, L. L.	.....Hawarden	3739 V	.....Hawarden
4650 Hildebeim, J. J.	.....Rock Valley		

SAC.

3445 Andre, T. J.....	Schaller	3380 Kessler, Joseph.....	Auburn
1182 Brimhall, O. W.....	Schaller	5374 Kennedy, J. D.....	Auburn
2811 Brown, Caleb.....	Sac City	5113 Kinsey, Carl.....	Carnarven
3502 Brooks, W. R.....	Schaller	5524 Kastner, Ferdinand.....	Wall Lake
4062 Bieser, J. H.....	Odebolt	4206 Petersmeyer, William.....	Odebolt
4847 Barkl, O. E.....	Sac City	5135 Page, F. W.....	Wall Lake
4275 Corey, O. S.....	Odebolt	2566 Rowe, E. E.....	Early
4363 Casavaw, G. W.....	Sac City	2197 Selby, R. W.....	Odebolt
4956 Cooke, S. R.....	Wall Lake	2774 Sifford, Charles.....	Lake View
4920 Graham, J. W.....	Early	3122 Selby, S. D.....	Odebolt
3859 Hunter, J. P.....	Lake View	3927 Smith, O. H.....	Odebolt
4953 Hopkins, O. M.....	Wall Lake	4541 Smale, Hubert.....	Sac City
5311 Hiron, W. P.....	Early	4036 Williams, A. J.....	Odebolt

STORY.

2544 Alpin, A. S.....	Cambridge	2349 Hostetter, J. I.....	Colo
952 Briggs, S. E.....	Nevada	4393 Hermanson, T. P.....	Roland
2881 Bosworth, L. M.....	Ames	4772 Ingledue, E. O.....	Zearing
3177 Benedict, George.....	Maxwell	3614 Judisch, George.....	Ames
3839 Briggs, George H.....	Nevada	5552 Kahrs, E. S. D.....	McCallsburg
4455 Bowman, I. L.....	Zearing	2161 Lax, Fred.....	Colo
2792 Campbell, O. E.....	Collins	2858 Lande, Amos.....	Slater
3637 Cagwin, J. E.....	Story City	4338 Loughran, T. J.....	Story City
4271 Carver, E. J.....	Colo	3909 Miller, H. D.....	Ames
5164 Carter, J. H.....	Collins	5635 Nordgren, E. E.....	Ames
5355 Clark, O. B.....	Gilbert Station	5654 Olinger, J. W.....	Maxwell
5583 Clutter, B. A.....	Ames	4874 Shuttleworth, H. W.....	Nevada
2847 Davis, W. A.....	Story City	5102 Shuttleworth, E. H.....	Nevada
3849 Davendorf, W. A.....	Story City	5543 Sparling, E. E.....	Ames
1463 Gandrup, W. D.....	Story City	4358 Thomas, O. H.....	Cambridge
5300 Gandrup, A. W.....	Cambridge	3848 Wray, W. L.....	Nevada
5539 Gandrup, H. D.....	Story City	5032 Winans, L. P.....	Slater
5804 George, R. E.....	Colo		

TAMA.

4938 Armstrong, E. F.....	Tama	2191 Nauert, J. H.....	Traer
4000 Baker, O. D.....	Toledo	1249 Stiger, Stephen.....	Toledo
1253 Coffin, R. M.....	Tama City	1252 Soleman, Henry.....	Tama City
4750 Crossman, W. P.....	Tama City	3217 Springer, George L.....	Garwin
5437 Christenson, S. A.....	Toledo	3961 Stevens, J. H.....	Montour
2891 Douglas, E. F.....	Dysart	4581 Sloan, W. O.....	Traer
3479 Grimm, W. H.....	Traer	4741 Snider, W. O.....	Tama City
4943 Gerard, S. A.....	Gladbrook	4737 Shugart, N. K.....	Elberton
3508 Ingleson, F. E.....	Tama	5011 Smith, L. B.....	Gladbrook
5336 Junker, W. E.....	Toledo	5046 Swallum, H. U.....	Garwin
4405 Kullmer, J. H.....	Dysart	5609 Stevens, L. M.....	Montour
4844 Kallem, J. L.....	Chelsea	5721 Soleman, F. A.....	Tama
4962 Knudson, L. O.....	Montour		

TAYLOR.

8 Babson, J. E.....	Blockton	2318 McCole, J. T.....	Gravity
2303 Bibbins, A. L.....	Bedford	3883 McCole, J. L.....	Gravity
2822 Bennett, T. W.....	Lenox	4896 Maiden, W. J.....	Lenox
1151 Childs, H. A.....	Lenox	5457 McCole, O. W.....	New Market
5388 Childs, A. A.....	Lenox	4613 Nelson, O. N.....	Bedford
4138 Dunlavy, H. F.....	Bedford	1376 Rhoades, H. B.....	Bedford
5612 Dean, W. E.....	Bedford	2387 Rockwell, R. B.....	Blockton
5440 Evans, J. E.....	Clearfield	5067 Robbins, T. L.....	Clearfield
3565 Fritz, W. L.....	Clearfield	5369 Remington, O. E.....	Bedford
1864 Golliday, A. M.....	Bedford	1635 Scroggs, J. P.....	Lenox
5030 Graff, G. L.....	Bedford	2563 Tyler, O. D.....	Lenox
4854 Hall, A. P.....	Blockton	3604 Wright, Frank.....	Conway
2155 King, A. E.....	Blockton	4314 Walker, J. O.....	New Market
5753 Long, O. S.....	Lenox	5342 Woolman, H. H.....	New Market
249 Maxwell, J. P.....	Clearfield	5375 Walker, O. G.....	New Market

UNION.

4569 Aldrich, Ed. A.....	Oreston	3636 Leach, J. W.....	Oreston
4671 Atkinson, G. H.....	Oreston	3790 Loomis, F. W.....	Shannon City
324 Bailey, A. S.....	Lorimer	4743 Logan, G. W.....	Cromwell
4992 Beerle, J. F.....	Oreston	4282 McDaniel, A. B.....	Afton
244 Cherry, J. W.....	Oreston	723 Norton, H. M.....	Kent
2194 Christy, W. D.....	Shannon City	5432 Newcomb, G. D.....	Oreston
4095 Coltrane, N. B.....	Afton	4223 Olinger, William.....	Thayer
3153 Foster, H. O.....	Oreston	2427 St. John, L. E.....	Lorimer
5368 Flood, O. A.....	Oreston	4290 Sullivan, E. F.....	Afton
4802 Gose, K. E.....	Lorimer	3649 Walker, L. M.....	Afton
1705 Kees, John.....	Oreston		

VAN BUREN.

1861 B	Bonaparte	4643 Powers, E. A.	Milton
2075 B	Farmington	510 Ragsdale, J. S.	Birmingham
18 O	Farmington	3876 Rice, J. A.	Milton
2007 D	Bonaparte	3777 Reininghaus, J. E.	Cantril
5047 D	Cantril	5200 Roberts, F. H.	Keosauqua
5040 E	Birmingham	680 Strickling, J. O.	Keosauqua
3033 F	Farmington	680 Sommers, L. F.	Milton
4232 J	Keosauqua	4485 Snyder, E. B.	Keosauqua
3035 K	Farmington	5075 Sloan, J. A.	Leando
2027 M	Milton	4774 Warden, Harry E.	Bonaparte
4251 P	Bonaparte		

WAPELLO.

5443 A	Ottumwa	5475 M	H.	Ottumwa
5646 B	Ottumwa	5505 M		Keb
5019 B	Blakesburg	5404 O		Eldon
1007 C	Ottumwa	1054 P	S.	Kirkville
3236 C	Ottumwa	4071 P		Eldon
4230 C	Ottumwa	155 R	A. J.	Agency
5460 C	Ottumwa	4370 R	A. L.	Ottumwa
1004 E	Ottumwa	5444 R		Eldon
1415 E	Ottumwa	5479 R	D. W.	Ottumwa
4402 E	Blakesburg	1730 S	B.	Ottumwa
903 G	Ottumwa	2198 S	W.	Ottumwa
3011 G	Ottumwa	3031 S	V.	Agency
2704 H	Ottumwa	3540 S	L.	Ottumwa
5413 H	Ottumwa	4304 S	H. L.	Ottumwa
4108 J	Ottumwa	4736 S	George E.	Eddyville
4518 K	Ottumwa	5447 S		Blakesburg
5716 L	Ottumwa	1605 T	O.	Ottumwa
4001 L	Ottumwa	4194 T	E.	Ottumwa
3450 M	Ottumwa	904 U		Ottumwa
4972 M	Ottumwa	3079 W	E.	Ottumwa
5116 M	Eldon	4517 W	L.	Ottumwa

WARREN.

4904 Fallows, E. H.	Milo	4030 Osborne, E. A.	Indianola
5406 Graffunder, O. L.	Carlisle	4344 Ralston, S. A.	Lacoma
3430 Husted, D. W.	Indianola	5230 Starr, J. W.	Lacoma
4730 Henderson, H. H.	Indianola	5348 Trimble, Rose E.	Indianola
4236 Irwin, Henry	Indianola	1205 Wilson, J. R.	New Virginia
3441 Kessing, J. J.	Cumtlaige	3033 Waugh, Walter	Milo
43 Nunnally, L. B.	Hartford		

WASHINGTON.

2041 Allen, B. F.	Kalona	3888 Israel, Mary	Brighton
5006 Bull, A. B.	Wellman	5232 Longwell, Jessie	Wellman
1300 Chilcote, W. E.	Washington	5239 Linn, O. A.	Riverside
1301 Cook, W. A.	Washington	5709 Lemmon, J. E.	Washington
4533 Carris, E. C.	Washington	3105 Stewart, J. H.	Washington
5744 Critz, L. W.	Riverside	3358 Stewart, C. W.	Washington
3489 Dosh, O. W.	Brighton	4172 Sherman, D. B.	Washington
1805 Glasgow, L. G.	Washington	525 Walker, W. A.	Washington
3551 Glasgow, J. B.	Washington	4447 Wray, A. M.	Kalona
5057 Griffith, L. E.	Riverside	5207 Watters, W. L.	Wellman
4009 Hochtetler, B. F.	Kalona	5406 Weidm, C. D.	Crawfordville
4034 Henderson, J. M.	Washington	5741 Wray, J. A.	Wellman

WAYNE.

5473 Armstrong, E. O.	Seymour	4905 Kidd, F. Z.	Allerton
3259 Bruner, D. M.	Olio	5738 McCulloch, Geo.	Humeston
5739 Bruner, W. A.	Lineville	4430 McCoy, John R.	Seymour
1421 Clark, E. K.	Seymour	4825 Morrison, T. L.	Seymour
3348 Downs, A. W.	Seymour	1873 Rankin, J. B.	Allerton
5372 Farr, F. E.	Humeston	535 Sproat, W. S.	Corydon
1380 Hinkle, C. W.	Harvard	5345 Shipley, E. P.	Corydon
2353 King, T. F.	Lineville	4055 Vanderley, John	Humeston

WEBSTER.

5326 Bailey, G. J.	Lehigh	5117 Kuntson, G. W.	Oallender
5557 Brown, J. O.	Badger	3854 Larson, T. S.	Fort Dodge
1689 Campbell, W. J.	Fort Dodge	5321 Lagerquist, Y. N.	Gowrie
3005 Cole, I. G.	Dayton	2635 McNamara, J. F.	Fort Dodge
2375 Cole, C. F.	Dayton	4674 Maher, W. F.	Fort Dodge
4834 Catlin, F. S.	Gowrie	5343 Miller, D. J.	Fort Dodge

WEBSTER—CONTINUED.

5381 Carver, R. F.....	Burnside	5395 Nordstrum, J. F.....	Dayton
5397 Christensen, John.....	Fort Dodge	5399 Olsson, O. M.....	Ft. Dodge
4535 Distmar, A. O. H.....	Fort Dodge	5394 Peterson, O. V.....	Lehigh
4545 Flaherty, J. F.....	Fort Dodge	5393 Peterson, A. O.....	Gowrie
5396 Fallon, G. S.....	Viacont	5391 Backett, E. W.....	Fort Dodge
5314 Gessell, O. L.....	Duncombe	5397 Saunders, O. J.....	Clare
4477 Griffin, H. M.....	Fort Dodge	5375 Vance, J. E.....	Gowrie
5345 Hise, J. B.....	Fort Dodge	4518 Van Stickle, Clark.....	Calender
5375 Haire, W. W.....	Fort Dodge	5395 Waldburger, J. C.....	Fort Dodge
4573 Hood, M. J.....	Clare	4599 Willett, O. A.....	Harcourt
4581 Hood, T. E.....	Clare	5390 Williams, H. D.....	Barnum
4816 Kehm, Conrad.....	Fort Dodge		

WINNEBAGO.

5057 Butts, O. M.....	Northwood	11 Newby, L. B.....	Lake Mills
4086 Cunningham, C. L.....	Woden	4686 Nicksen, J. D.....	Forest City
4107 Fletcher, O. T.....	Thompson	5399 Pinckney, F. A.....	Forest City
5793 Glaze, A. H.....	Buffalo Center	4698 Polson, G. E.....	Buffalo Center
4651 Helgeson, P. A.....	Lake Mills	5385 Pinckney, Edwin.....	Forest City
5350 Koto, F. O.....	Forest City	4715 Sorenson, P. E.....	Lake Mills
5355 Keeler, C. E.....	Lake Mills	5547 Suby, J. I.....	Forest City
5080 McKay, J. H.....	Buffalo Center		

WINNESHIEK.

5556 Allen, R. E.....	Ridgeway	5114 Merritt, F. H.....	Ossian
5123 Blaschaine, O. H.....	Ossian	4526 Parmas, E. J.....	Calmar
4510 Brunt, I. W.....	Decorah	5486 Park, C. G.....	Calmar
5394 Engbartson, Richard.....	Decorah	1381 Riggs, W. K.....	Ostalla
5139 Horton, C. D.....	Fort Atkinson	5078 Sorenson, A. J.....	Decorah
5719 Lamm, J. J.....	Decorah	1782 Tower, Hannibal.....	Fort Atkinson
5735 Lomen, Gustav.....	Decorah	683 Worth, Fordyce.....	Hesper
1011 Mills, O. J.....	Ossian	5708 Wemack, J. L.....	Ridgeway
5049 Miller, F. T.....	Fort Atkinson		

WOODBURY.

1796 Arnold, O. F.....	Sioux City	1917 M.....	Sioux City
4710 Anderson, O. E.....	Noville	5099 M.....	Sloan
4997 Andreen, Carl.....	Sioux City	5350 M.....	Sergeant's Bluffs
5397 Ashford, G. W.....	Sioux City	5398 M.....	Sioux City
5703 Beppler, J. F.....	Sioux City	5394 M.....	Sioux City
4003 Brooks, H. A.....	Oto	5393 M.....	Sioux City
5351 Baker, H. S.....	Sioux City	5313 M.....	Sioux City
5385 Bradish, O. E.....	Sioux City	5381 M.....	Sioux City
5394 Crady, E. E.....	Sioux City	4581 N.....	Sioux City
3549 Cummings, I. P.....	Sioux City	5096 N.....	Pierson
4593 Crain, W. L.....	Cushing	4978 O.....	Danbury
4918 Countermine, E. H.....	Salix	5483 O.....	Danbury
5043 Dewey, W. H.....	Noville	1419 R.....	Smithland
5436 Evans, F. D.....	Sergeant's Bluffs	2936 S.....	Correctionville
5436 Fraus, F. W.....	Sioux City	3043 Sc.....	Sioux City
5083 Foster, O. G.....	Sioux City	3953 Sc.....	Sioux City
5449 Guiney, H. P.....	Sioux City	3304 Se.....	Sioux City
774 Hope, G. T.....	Sioux City	4153 Se.....	Sioux City
1185 Hansen, F.....	Sioux City	4784 Sn.....	Sioux City
5391 Henderson, H. C.....	Sioux City	4796 Sc.....	Sioux City
5392 Hasfner, E. O.....	Sioux City	4819 St.....	Sioux City
5180 Harstad, Oliver.....	Sioux City	5769 Sc.....	Noville
5139 Jones, O. H.....	Salix	3439 Tl.....	Sioux City
5144 Knox, L. P.....	Sioux City	3646 Tl.....	Sioux City
5355 Kilse, J. F.....	Sioux City	3724 Tc.....	Anthony
4951 Kloster, B. J.....	Sioux City	4688 Tl.....	Sioux City
1386 Loucka, E. H.....	Danbury	2204 W.....	Correctionville
5318 Lase, D. G.....	Pierson	4486 W.....	Smithland
3499 Lander, W. E.....	Sioux City	5755 W.....	Sioux City
4895 Lundhren, C. W.....	Sioux City	5956 Y.....	Correctionville
5329 Lerch, Fred, Jr.....	Sioux City	4707 Y.....	Hornick

WORTH.

5366 Brown, L. O.....	Northwood	5436 Phillips, Mrs. N. W.....	Fertile
5101 Dillon, G. W.....	Northwood	5484 Robinson, O. E.....	Northwood
944 Emery, J. F.....	Kensett	4500 Swallow, George.....	Grafton
5353 Emery, G. M.....	Northwood	4953 Sanders, C. W.....	Manley
4419 Hansen, A. W.....	Northwood	5700 Sanders, W. O.....	Manley
5198 Gray, H. E.....	Kensett	5518 Thomson, Nels.....	Northwood
1834 Jones, J. E.....	Fertile	945 Wilson, O. E.....	Kensett

WRIGHT.

4899	B	..... Belmont	5070	Morse, O. H.	..... Eagle Grove
5062	O	..... Olarion	5041	Mulnix, A. B.	..... Dows
4782	E	..... Eagle Grove	5061	McAdams, A. E.	..... Holmes
2065	F	..... Olarion	5062	Newman, E. P.	..... Dows
5003	F	..... Bowan	5009	Nichols, W. E.	..... Eagle Grove
5132	F	..... Galt	5582	Parker, L. T.	..... Eagle Grove
5141	H	..... Belmont	5217	Prann, W. E.	..... Goldfield
4454	H	..... Olarion	5221	Smallpaige, R. H.	..... Eagle Grove
4514	H	..... Olarion	5201	Smith, J. C.	..... Eagle Grove
4513	H	..... Olarion	5765	Smallpaige, J. B.	..... Eagle Grove
5411	H	..... Dows	4536	Smith, J. C.	..... Woolstock
5351	H	..... Olarion	4806	Stauffer, W. F.	..... Eagle Grove
5448	G	..... Goldfield	5003	Will, F. J.	..... Eagle Grove
3324	K	..... Belmont	5054	Wood, H. L.	..... Eagle Grove
2963	M	..... Dows			

SYNOPSIS OF STATE PHARMACY REGISTER.

From May 1, 1897, to May 1, 1899.

REGISTRATIONS, REVOCALS, FORFEITURES, ETC.

Number of examinations	566
Number of re-examinations	309
Total number of examinations	875
Of this number 306 have passed successful examinations and gold seal certificates have been granted them.	
Registered as graduates	114
Number of registered pharmacists who have died in two years..	58
Number of certificates canceled at owner's request	33
Total number of certificates revoked, canceled and super- seded (become void)	91
Number of certificates issued during same time. {	
Red seal.....	114
Gold seal.....	306— 420
Showing a gain in the two years of	329
Number of certificates in active force in the state May 1, 1897...	2,836
Number of certificates in active force in the state May 1, 1899...	2,987
Being 151 more May 1, 1899, than at last report May 1, 1897.....	151
Of the above 2,987 certificates in force May 1, 1899, there were in active business as proprietors	1,786
In active business as clerks	642
Total in active business	2,428
Proprietors and clerks out of business	559
Total number registered since passage of the pharmacy law to September 1, 1899	2,987
	5,793

CERTIFICATE.

IOWA COMMISSIONERS OF PHARMACY, }
OFFICE OF THE SECRETARY, }
STATE CAPITOL, DES MOINES, IOWA. }

I, Charles W. Phillips, secretary of the commissioners of pharmacy for the state of Iowa, hereby certify that the foregoing abstract of the state pharmacy register is copied from the original register on file in this office, and that the same is true and correct.

In testimony whereof, I have hereunto set my hand and affixed the seal of the commission this 15th day of September, A. D. 1899.

[SEAL.]

CHARLES W. PHILLIPS,
Secretary of the Commission.

OFFICIAL RULES OF THE COMMISSIONERS OF PHARMACY.

The following rules have been adopted by the commission in accordance with the authority of code, section 2584, as amended by the Twenty-seventh General Assembly, 1898:

RULE 1. For the purpose of facilitating the enforcement of the pharmacy law, the state has been districted, and the counties assigned to each of the commissioners are as follows:

To Commissioner N. T. Hendrix, Columbus Junction, Iowa.—Adair, Adams, Appanoose, Cass, Clarke, Davis, Decatur, Des Moines, Fremont, Henry, Jefferson, Keokuk, Lee, Louisa, Lucas, Madison, Marion, Monroe, Montgomery, Mills, Muscatine, Mahaska, Page, Ringgold, Taylor, Union, Van Buren, Wapello, Warren, Washington, Wayne.

To Commissioner W. E. Leland, Hawarden.—Allamakee, Bremer, Buena Vista, Butler, Cerro Gordo, Cherokee, Chickasaw, Clay, Clayton, Dickinson, Emmet, Fayette, Floyd, Franklin, Hancock, Howard, Humboldt, Kossuth, Lyon, Osceola, Mitchell, Palo Alto, Pocahontas, Plymouth, Sioux, Winnebago, Winneshiek, Woodbury, Worth, Wright.

To Commissioner Fletcher Howard, Des Moines.—Audubon, Benton, Black Hawk, Boone, Buchanan, Calhoun, Carroll, Cedar, Clinton, Crawford, Dallas, Delaware, Dubuque, Greene, Grundy, Guthrie, Hamilton, Hardin, Harrison, Ida, Iowa, Jackson, Jasper, Johnson, Jones, Linn, Marshall, Monona, Polk, Pottawattamie, Poweshiek, Sac, Scott, Shelby, Story, Tama, Webster.

All complaints of violation of the pharmacy law should be referred to the commissioner in whose district they occur.

RULE 2. All examinations in pharmacy will be held in the office of the pharmacy commission, at the capitol building, in the city of Des Moines, on the first Tuesday of each month, excepting when such day occurs on a legal holiday or a day usually observed as a holiday, when such examination will be held on the Thursday following.

RULE 3. All applications for examination shall be made upon blank forms which will be furnished by the secretary of the commission on request.

RULE 4. All applicants for examination must be 21 years of age, of good moral character, able to speak, read and write the English language, and possessed of sufficient general education. Such applicant must have pursued the study of pharmacy for two full years in actual apprenticeship with a registered pharmacist in a drug store, or must be a graduate of a recognized medical school, who has engaged for the three years last past in the actual and active practice of medicine. But the time actually spent in

a recognized school of pharmacy, not exceeding one year, shall be allowed as a credit on above time. Applicants are required to correctly answer 75 per cent of the questions submitted by the commission on examination.

RULE 5. Persons over 18 and under 21 years of age, possessing the other qualifications provided in rule 4, may be registered as assistant pharmacists and will receive certificates accordingly, and when the holder attains his majority, said certificate may be exchanged upon application for a certificate of full registration.

RULE 6. Graduates of pharmacy schools desiring registration will make application upon blanks to be furnished by the commission, accompanied by their diploma, and shall furnish such proof regarding the course of study pursued therein as may be required by the commission.

RULE 7. In all cases where registered pharmacists have two certificates of registration, the last certificate issued will supersede the former, and renewals will be required on the last one only.

RULE 8. Examinations shall be conducted in writing, and the applicant shall be allowed no assistance of any kind, verbal or oral, therein. Any applicant violating this rule and receiving aid in his examination may be summoned by the commissioners and required to submit to a new examination. Should the person so summoned refuse or neglect to obey the order of the commission, or should he appear from such second examination to be incompetent and not possessed of the requisite knowledge and skill, the commissioners will cancel his certificate and strike his name from the register. In like manner they will cancel the certificates of all persons who have secured registry by fraud or false representation.

RULE 9. Whenever application is made to the commission to revoke certificates of registration for violation of any of the laws governing registered pharmacists, the prosecution shall present and file with the secretary of this board a duly certified transcript of the final judgment of conviction, identifying the guilty party by giving the number of his or her certificate of registration. Upon the filing of the application for revocation, with the transcript aforesaid, the commission shall fix a time for the hearing thereof, and shall cause written notice of said complaint to be served upon the accused at least ten days prior to the time fixed for such hearing. Said notice shall in general terms inform the accused of the nature of the charge against him, and of the time when and of the place where the same will be heard. The accused may, on or before the day set for the hearing, show cause why his certificate should not be revoked.

RULE 10. Licenses issued to itinerant vendors of drugs, nostrums, ointments, "or appliances of any kind for the treatment of disease or injury," by this commission, under the provisions of section 2594 of the code, can be transferred by the owner thereof sending the same to the secretary of the commission, who shall record the transfer and make the endorsement upon the license, and the transferee shall be entitled to use the same for the unexpired portion of the term.

RULE 11. All pharmacists are forbidden to sell any bitters, cordials, elixirs, wines, etc., put up in the form of proprietary medicines, where the same can be used as an intoxicant, unless the pharmacist holds a permit authorizing him to sell intoxicating liquors, and sale must be made then only in the same manner as any other intoxicating liquor, by requiring the purchaser to apply in writing therefor upon the regular form.

RULE 12. With this official circular will be found the following official forms:

A—Notice of application for permit.

B—Petition for permit.

C—Bond.

D—Permits to buy, keep and sell intoxicating liquors.

E—Request of purchasers. Series A and B.

F—Permit holders' record of purchases, sales and uses.

G—Permit holders' bi-monthly statement to the county auditor of purchases, sales and uses.

H—Permit holders' bi-monthly report and affidavit of request.

These forms have been adopted by the commission, and all pharmacists holding permits to buy, keep and sell intoxicating liquors are required to use forms E, F, G and H.

RULE 13. These rules shall be in force and effect ten days after the date of their publication in the official circular of the commissioners of pharmacy, and when they take effect all previous rules adopted by the commission shall be superseded.

FLETCHER HOWARD,
N. T. HENDRIX,
W. L. LELAND,
Commissioners.

NOTICE TO PHARMACISTS.

For the guidance and information of pharmacists throughout the state, the commissioners desire to call attention to some of the important provisions of the statute.

First.—That none but registered pharmacists can conduct a drug store or pharmacy; they must be the principals and managers of the store in *all its management*; neither can they allow anyone not registered to sell medicines or poisons, or dispense physicians' prescriptions, except under their direct supervision. (See supreme court decision, *State v. Norton*, 67 Iowa, page 641.)

Second.—Sales of medicines and poisons can only be made by a proprietor, principal or clerk who is a registered pharmacist, and who is required to keep a record of all poisons sold, included in schedule A of section 2593 of the code.

Third.—The certificates of all registered pharmacists must be conspicuously posted in the place of business or pharmacy which they are conducting, or in which they are employed, with the renewal certificate placed in the lower left hand corner, and change of locality certificate (if they have changed their locality) in lower right hand corner of each certificate, to show to the public that their certificate of registration is in full force and effect.

Fourth.—All registered pharmacists when they change their locality are required to notify the secretary of the commission, and have their change of locality recorded, otherwise they are liable to a fine for each month's delinquency, and when so delinquent their certificates are not in full force and effect.

Fifth.—A registered pharmacist's certificate is regarded "in full force and effect," when he holds a renewal of his certificate from March 22d to March 22d of the current year, and change of locality certificate if he has changed his location, unless subsequently forfeited and revoked.

Sixth.—Annual renewals are not required or issued for the first part of a year preceding the 22d day of March; the pharmacist's certificate of registration is evidence that it is in full

force and effect from the date of its issuance to the following 22d of March; however, the certified statement up to date of the secretary of the commission of pharmacy, under official seal of said commission, is regarded the best legal evidence as to whether a person is registered or not.

Seventh.—Registered pharmacists are exempt from jury duty. (See section 833, code of 1897.)

Eighth.—The code, section 2593, regulating the sale of poisons, is applicable to all patent preparations and non-secret preparations containing poisons enumerated in schedules "A" and "B."

It is unlawful for any person except a registered pharmacist to sell such preparations for any purpose whatever.

Ninth.—The sale of homeopathic medicines, except such as the law denominates "proprietary medicines," properly comes under the regulations of the pharmacy law, and all proprietary medicines containing poisons can be sold only by registered pharmacists as provided by the pharmacy law. The sale, therefore, of any quantity of poison or poisonous preparations enumerated in section 2593 of the code, or of proprietary medicines containing such poisons, can only be made by registered pharmacists. In our opinion, a technical construction is warranted in the sale of a single bottle of these remedies (except as provided in section 2593), for notwithstanding the contents of an entire bottle proved harmless, the purchase and use of several bottles of the same might be fatal.

Tenth.—It is impossible to keep a correct alphabetical list of names of the pharmacists of the state because of the constant change made in the list; we therefore earnestly request all registered pharmacists when corresponding with the commission to give the number of their certificates as well as their names.

FLETCHER HOWARD,

N. T. HENDRIX,

W. L. LELAND,

Commissioners.

[Code of 1897, as amended by Twenty-seventh General Assembly, 1898.]

CHAPTER 6.

TO REGULATE THE KEEPING AND SALE OF INTOXICATING LIQUORS BY REGISTERED PHARMACISTS.

SEC. 2385. *Permits.*—Persons holding permits may sell and dispense intoxicating liquors, not including malt liquors for pharmaceutical and medical purposes, and to permit holders for use and resale by them, only for the purposes authorized in this chapter; they may also sell and dispense alcohol for specified chemical and mechanical purposes, and wine for sacramental uses. Registered pharmacists, physicians holding certificates from the state board of medical examiners, and manufacturers of proprietary medicines may buy from permit holders intoxicating liquors (not including malt) for the purpose of compounding medicines, tinctures and extracts that cannot be used as a beverage, but nothing herein contained shall be construed to authorize the manufacture or sale of any preparation or compound, under any name, form or device, which may be used as a beverage, and which is intoxicating in its character.

SEC. 2386. *Pharmacists—manufacturers of proprietary medicines.*—If any such registered pharmacist or manufacturer of proprietary medicines shall sell, barter, give, exchange, dispose of or use intoxicating liquors in any manner or for any purpose other than authorized in the preceding section, he shall be liable to all the penalties and proceedings provided for in this chapter, and, upon proof of such violation by a registered pharmacist, the clerk of the district or superior court shall transmit to the commissioners of pharmacy a certified copy of the record thereof within ten days after its entry, and upon receipt of such certified copy said commissioners may strike his name from the list of registered pharmacists and cancel his certificate. The commissioners of pharmacy are empowered to make such further rules and regulations, not inconsistent with law, with respect to the purchase, keeping and use of intoxicating liquors by registered pharmacists and manufacturers of

proprietary medicines, as they shall think proper to prevent abuses of the privilege, and shall revoke the certificate of registration of any pharmacist for repeated violations of this chapter. Said commissioners are authorized to draw from the state treasury an amount not exceeding 50 per cent of the clear proceeds of all fees collected and paid into the treasury of any county on account of violations of the provisions of this chapter or the chapter regulating the practice of pharmacy, prosecuted by the commissioners, the amount so drawn to be used solely in prosecutions instituted by them for failure to comply with the provisions of such chapters. The court or clerk thereof, before whom any prosecution is instituted or prosecuted by the commissioners of pharmacy, shall certify to the auditor of state all such cases, and the amount of fees imposed and collected therein. The expenses thus incurred by the commission shall be audited by the executive council, and the amount thereof shall be drawn from time to time upon the warrants of the state auditor.

SEC. 2387. *Application for permit.*—All applications for a permit to sell intoxicating liquors for the purposes allowed in this chapter shall be by petition, signed and sworn to by the applicant, and filed in the office of the clerk of the district or superior court of the county or city in which the buying and selling is to be carried on at least ten days before the term at which the matter is to be for trial, which petition shall set out the name of the applicant, his residence and business and that for the two previous years, the place, particularly describing it, where the business is to be conducted, that he is a citizen of the United States and of this state, that he is a registered pharmacist, that now and for the six months last past he has been lawfully conducting a pharmacy in the township, town or city wherein he proposes to engage in the business under the permit applied for, that he has not been adjudged guilty of any violation of the law relating to intoxicating liquors within the two years next preceding the making of his application, is not the keeper of a hotel, eating house, saloon, restaurant or place of public amusement, and that he is not addicted to the use of intoxicating liquors as a beverage, and desires a permit to buy, keep and sell liquors for lawful purposes only. If the applicant has previously held a permit which has been revoked, his petition, in addition to the foregoing requirements, shall state

that he has not, within the last two years next before making the application, knowingly been engaged, employed or interested in the unlawful manufacture, sale or keeping with intent to sell of intoxicating liquors.

SEC. 2388. Notice.—Notice of an application for a permit must be published for three consecutive weeks in a newspaper regularly published and printed in the English language, and of general circulation in the township, town or city where the applicant proposes to conduct the business, or, if none be regularly published therein, then in one of the papers selected by the board of supervisors for the publication of its proceedings, the last publication of which shall be not less than ten nor more than twenty days before the first day of the term at which the hearing is to be had. This notice shall state the name of the applicant, with the firm name, if any, under which he is doing business, the purpose of the application, the particular location of the place where the proposed business is to be carried on, and that the required petition is or will be on file in the clerk's office of the court (naming it) at least ten days before the first day of the term (naming it) when the application will be made. A copy of such notice shall be served upon the county attorney in the same manner and for the same length of time as is required of original notices in said courts.

SEC. 2389. Hearing—remonstrances.—Upon the return day of the notice, the court having, from an inspection of the record, ascertained that due and timely service thereof has been made, shall, if no remonstrance has been or is offered to be filed, unless for cause postponed to some other day in the term, proceed to hear and try the application. Any remonstrance against or objection to the granting of the permit must be in writing and filed in the clerk's office by noon of the first day of the term, unless further time be given, and shall be so filed before the date fixed for the trial. Such remonstrance or objections may be made by any citizen of the county wherein the application is made, specifically stating the reasons therefor, and the court shall fix a day in the term for the trial, and all applications shall be tried at the first term after completed service has been made of the required notice, if the business of the court shall allow. No permit shall be granted unless the court shall find from competent evidence that all the averments in the petition are true, that the reasonable convenience and necessities of the people, considering the population and all the surroundings, make the

granting of the permit proper, and that the applicant is possessed of the character and qualifications required, worthy of the trust to be reposed in him, and likely to discharge the same with fidelity. The county attorney shall appear in such cases, and any number of persons, not less than five, filing any remonstrance or objection, may also appear by counsel and resist the application. If more than one permit is applied for in the same locality, the applications shall be heard at the same time, unless for cause shown it be otherwise ordered. If for any reason the application cannot be tried in term time, the same may be heard by the judge in vacation, at a time to be fixed by the court and made of record, and in all applications for permits the court may grant or refuse any or all applications, as will best subserve the public good.

SEC. 2390. *Bond.*—No permit shall issue until the applicant shall execute to the state a bond in the penal sum of \$1,000, with good and sufficient sureties to be approved by the clerk of the court, conditioned that he will well and truly observe and obey the laws of the state now or hereafter in force in relation to the sale of intoxicating liquors, that he will pay all fines, penalties, damages and costs that may be assessed or recovered against him for a violation of such laws during the time for which the permit is granted, and the principal and sureties in said bond shall be liable thereon, jointly and severally, for all civil damages and costs that may be recovered against the principal in any action brought by a wife, child, parent, guardian, employer or other person under the provisions of this chapter. The bond, after being approved by the clerk, shall be deposited with the county auditor, and suit may be brought thereon at any time by the county attorney, or by any person for whose benefit the same is given. The clear proceeds of all other money which may be collected for breaches of the bond shall go to the school fund of the county. If at any time the sureties on the bond shall file with the court or clerk a written request for release, or become insolvent, or be deemed insufficient by the court granting the permit, or its clerk, such court or clerk shall require a new bond to be executed within a reasonable time to be fixed. If the permit holder fails or neglects to furnish a new bond within the time so fixed, the permit shall from that date become null and void.

SEC. 2391. *Oath of applicant.*—In addition to giving the bond required, the applicant shall take and subscribe the following

oath, which shall be indorsed upon the bond: "I, do solemnly swear (or affirm) that I will well and truly perform all and singular the conditions of the within bond, and keep and perform the trust confided in me to purchase, keep and sell intoxicating liquors. I will not sell, give or furnish to any person any intoxicating liquors otherwise than as provided by law, and especially I will not sell or furnish any intoxicating liquors to any person who is not known to me personally, or duly identified, nor to any minor, intoxicated person, or persons who are in the habit of becoming intoxicated; and I will make true, full and accurate returns of all certificates and requests made to or received by me as required by law; and said returns shall show every sale and delivery of such liquors made by me, or for me, during the months embraced therein, and the true signature to every request received and granted; and such returns shall show all the intoxicating liquors sold or delivered to any and every person, as returned."

SEC. 2392. *Permit issued.*—Upon taking said oath and filing said bond, the clerk of the court granting the same shall issue a permit to the applicant, authorizing him to keep and sell intoxicating liquors as in this chapter provided. The permit so issued shall specify the building, give the street and number or location in which intoxicating liquors may be sold by virtue of the same, and the length of time the same shall be in force, unless sooner revoked. *Provided*, that upon the lease or destruction of the building where such business is conducted, or for other good and sufficient cause shown, consent in writing of the bondsmen having been obtained therefor, or a new bond given, the district court of the county which granted said permit, or a judge of said court, may change the place specified in said permit to some other place in the same city or township, upon motion therefor. A copy of said motion, and notice of the time when and the place where the same shall be heard, shall be given to the county attorney of the county where said place is situated at least five days before said hearing.

SEC. 2393. *Record—costs.*—The clerk of the court granting the permit shall preserve, as a part of the record and files in his office, all petitions, bonds and other papers pertaining to the granting or revocation of permits, and keep suitable books in which bonds and permits shall be recorded. The books shall be furnished by the county like other public records. Whether said permit be granted or refused, the applicant shall pay the

costs incurred in the case, and when granted he shall make payment before any permit issue, except the court may tax the cost of any witnesses summoned by private persons resisting said application, and the fees for serving such subpoenas, to such persons, when it is shown that such witnesses were summoned maliciously or without probable cause to believe their evidence material. The fees in such cases shall be as provided in actions at law in the district court.

SEC. 2394. *Requests to purchase.*—Before selling or delivering any intoxicating liquors to any person, a request must be signed by the applicant, in his true name, truly dated, stating the applicant is not a minor, his residence, for whom and whose use the liquor is required, and his true name and residence, and, where numbered, by street and number if in a city, the amount and kind required, the actual purpose for which the request is made and for what use desired, and that neither the applicant nor the person for whose use requested habitually uses intoxicating liquors as a beverage, and attested by the permit holder who receives and fills the request. The request shall be refused unless the permit holder has reason to believe the statement to be true, and in no case granted unless the permit holder filling it personally knows the person applying is not a minor, intoxicated, nor in the habit of using intoxicating liquors as a beverage; or, if the applicant is not so personally known, before filling the order or delivering the liquor, he shall require identification, and the statement in writing of a reliable and trustworthy person, of good character and habits, known personally to him, that the applicant is not a minor, nor in the habit of using intoxicating liquors as a beverage, and is worthy of credit as to the truthfulness of the statements in the application; and this statement so made shall be signed by the witness in his own name, stating his residence correctly.

SEC. 2395. *Penalties.*—If any person shall make any false or fictitious signature, or sign any name other than his own to any paper required to be signed, or make any false statement in any paper or application signed to procure liquors, the person so offending shall be punished by a fine of not less than \$20 nor more than \$100 and costs of prosecution, and shall be committed until said fine and costs are paid, or shall be imprisoned not less than ten nor more than thirty days. If any permit holder or his clerk shall make false oath touching any matter required to be sworn to, the person so offending shall be punished as provided

by law for perjury. If any person holding a permit under this chapter shall purchase or procure any intoxicating liquor otherwise than as herein authorized, or make any false return to the county auditor, or use any request for liquors for more than one sale, he shall be guilty of a misdemeanor and punished accordingly.

SEC. 2396. *Transportation by permit holder.*—Every permit holder is hereby authorized to ship to registered pharmacists and manufacturers of proprietary medicines intoxicating liquors to be used by them for the purposes authorized by law. All railway, transportation and express companies and other common carriers are authorized to receive and transport the same upon presentation of a certificate from the clerk of the district or superior court of the county where the permit holder resides, that such person is permitted to ship intoxicating liquors under the law of this state.

SEC. 2397. *Returns by permit holder.*—On or before the 15th day of January, March, May, July, September and November of each year each permit holder shall make full returns to the county auditor under oath, of all requests filled by him and his clerks during the two preceding months, which oath shall be in the following form: "I,, being duly sworn, on oath state that the requests for liquors herewith returned are all that were received and filled at my pharmacy (or place of business) during the months of....., A. D.....; that I have carefully preserved the same, and that they were filled up, signed and attested at the date shown hereon, as provided by law; that said requests were filled by delivering the quantity and kinds of liquors required, and that no liquors have been sold or dispensed under color of my permit during said months except as shown by the requests herewith returned, and that I have faithfully observed and complied with the conditions of my bond and oath taken by me thereon indorsed, and with all the laws relating to any duties in the premises.

SEC. 2398. *Account of purchases and sales.*—Every permit holder shall keep strict account of all liquors purchased or procured by him in a book kept for that purpose, which shall be subject at all times to the inspection of the commissioners of pharmacy, the county attorney, any grand juror, sheriff or justice of the peace of the county, and such book shall show of whom such liquors were purchased or procured, the amount

and kind, the date of receipt and amount sold; also the amount on hand of each kind for each two months, and at the same time he returns requests to the county auditor he shall file a statement of such account with such auditor, except that the items of sales need not be embraced therein, but the aggregate amount of each kind shall be, and such statement shall be verified. All forms necessary to carry out the provisions of this chapter not otherwise provided for shall be as may be provided by the commissioners of pharmacy.

SEC. 2399. *Illegal sales by permit holder—evidence.*—Every permit holder or his clerk shall be subject to all the penalties, forfeitures and judgments, and may be prosecuted by all the proceedings and actions criminal and civil, whether at law or in equity, provided for or authorized by this chapter, and the permit shall not shield any person who abuses the trust imposed by it or violates the law. In case of conviction in any proceeding, civil or criminal, the liquors in possession of the permit holder shall by order of the court be destroyed, and on the trial of an action or proceeding against any person for manufacturing, selling, giving away or keeping with intent to sell intoxicating liquors in violation of law, or for any failure to comply with the conditions or duties imposed by law, the requests for liquors and returns made to the auditor, the quantity and kinds of liquors sold, or kept, purchased or disposed of, the purpose for which liquors were obtained by or from him and for which they were used, the character and habits of sobriety or otherwise of the purchasers, shall be competent evidence, and may be considered, so far as applicable to the particular case, with any other recognized, competent and material facts and circumstances bearing on the issues involved in determining the ultimate facts. In any suit, prosecution or proceeding under this chapter the court shall compel the production in evidence of any books or papers required to be kept, and shall compel any permit holder, his clerk, or any person who has purchased liquors of either of them, to appear and give evidence, but such oral evidence shall not be used against such person or witness on the trial of any criminal proceeding against him.

SEC. 2400. *Revocation of permit.*—Permits shall be deemed trusts reposed in the recipients, and may be revoked upon sufficient showing by order of a court or judge. Complaint may be presented at any time to the district or superior court, or a judge

thereof, which shall be in writing and signed and sworn to by three citizens of the county in which the permit was granted. A copy of the complaint shall, with a notice in writing of the time and place of hearing, be served on the accused five days before the hearing, and if the complaint is sufficient, and the accused appear and deny the same, the court or judge shall proceed without delay, unless continued for cause, to hear and determine the controversy. If continued or appealed at the instance of the permit holder, his permit may, in the discretion of the court, be suspended pending the controversy. The complainant and accused may be heard in person or by counsel, or both, and proofs may be offered by the parties; and if it shall appear upon such hearing that the accused has in any way abused the trust, or that liquors are sold by the accused or his employes in violation of law, or dispensed unlawfully, or he has in any proceeding, civil or criminal, within the last two years, been adjudged guilty of violating any of the provisions of this chapter, the court or judge shall revoke and set aside the permit; the papers and order in such case shall be immediately returned to and filed by the clerk of the court, and, if heard by a judge, the order shall be entered of record as if made in court; and if in this or any other proceeding, civil or criminal, it shall be adjudged by the court or judge that any registered pharmacist, proprietor or clerk, has been guilty of violating any provision of this chapter, such adjudication may be by the commissioners of pharmacy regarded as sufficient, if repeated, to work a forfeiture of his certificate of registration. It shall be the duty of the clerk to forward to the commissioners of pharmacy transcripts of such judgments or orders without charge therefor, and as soon as practicable after final judgment or order has been made and entered.

SEC. 2401. *How business conducted—clerks—physicians.*—A permit holder may employ not more than two registered pharmacists as clerks to sell intoxicating liquors in conformity to the permit and the law; but in such cases the acts of clerks in conducting the business shall be considered the acts of the permit holder, who shall be liable therefor as if he had personally done them, and in making returns, the verification of such requests as may have been received, attested and filed by the clerk must be made by such clerk, and the clerk who transacted any of the business under the permit must join in the general oath required

of the employer, so far as relates to his own connection therewith. If for any cause a registered pharmacist who holds a permit shall cease to hold a valid and subsisting certificate of registration or renewal thereof, his permit shall be forfeited and be null and void. Nothing contained in this chapter shall be construed to prevent licensed physicians from in good faith dispensing liquors as medicines to patients actually sick and under their treatment. In case a permit holder shall die, his personal or legal representative may continue the business, subject to the provisions hereof, through the agency of any reputable registered pharmacist, upon the approval of the court granting such permit, or the clerk thereof, and the giving of a bond as hereinbefore provided.

SEC. 2402. *Intoxication punished.*—If any person shall be found in a state of intoxication he is guilty of a misdemeanor, and any peace officer shall, without a warrant, take him into custody and detain him in some suitable place until an information can be made before a magistrate, and a warrant of arrest issued, under which he shall at once be taken before the magistrate issuing the same, or, if for any reason he cannot act, to the next nearest one, where he shall be tried, and, if found guilty, shall be fined in the sum of not less than \$5 nor more than \$25 and costs of prosecution, or imprisoned in the county jail not more than thirty days. The penalty, or any portion of it, may be remitted by the magistrate before whom the trial is had, and the accused discharged from custody, upon his giving information in writing and under oath, stating when, where and of whom he purchased or received the liquor which produced the intoxication, and the kind and character of this liquor, and, in addition, giving bail for his appearance before any court to give evidence in any action or complaint to be commenced or preferred against such party for furnishing the same.

SEC. 2403. —*Selling or giving to minor or intoxicated person or person in the habit of becoming intoxicated.* No person by himself, agent or otherwise, shall sell or give any intoxicating liquors to any minor for any purpose, except upon written order of his parent, guardian or family physician, or sell the same to any intoxicated person or one in the habit of becoming intoxicated. Any person violating the provisions of this section shall forfeit and pay the sum of \$100, to be collected by action against him,

or, if a permit holder, against him and the sureties on his bond. Such action may be brought by any citizen of the county. One-half of the amount so collected shall go to the informer and one-half to the school fund of the county.

SEC. 2432. *Payment of mulct tax.*—Any permit holder selling intoxicating liquors as a beverage shall pay the tax provided for in this section.

CHAPTER 18.

OF PRACTICE OF PHARMACY.

SECTION 2584. *Commissioners—powers.*—The commission of pharmacy shall consist of three competent pharmacists who have been for the preceding five years residents of the state and engaged in practicing pharmacy, one of whom shall be annually appointed by the governor and hold office for three years and until his successor is appointed and qualified. The commission shall have power to make all needed regulations for its government and for the proper discharge of its duties under this chapter, the same to be done without expense to the state, save the necessary blanks and stationery, which shall, upon requisition, be furnished by the secretary of state, and make such other regulations not inconsistent with law and as authorized in this code, respecting the purchase, keeping and use of intoxicating liquors by registered pharmacists not permit holders, as may be required for the prevention or abuse of the trust reposed in them, and such other matters as may be hereinafter specifically enumerated.

SEC. 2585. *Secretary and treasurer.*—The commissioners of pharmacy shall annually, on the first Monday in May, elect a suitable person, who shall not be a member of said board, and who shall be known as secretary and treasurer; said secretary and treasurer shall enter upon the discharge of his duties as soon as he shall have filed with the secretary of state a good and sufficient bond in the penal sum of \$3,000, signed by at least two sureties, who shall justify in the aggregate to double the amount of said bond, and which shall bear upon its face the approval of the governor. The salary of said secretary and treasurer shall not exceed \$1,500 per annum.

SEC. 2586. *License fees.*—The secretary and treasurer shall keep in his office a book known as the “commissioners of pharmacy license fee book,” which shall be made with ruled columns and printed headings, showing the date, the name of the person paying, and the amount of each license and fee paid, in which he shall enter all fees for licenses received by him, and on the first Monday of each month he shall file with the auditor of state a true statement thereof for the previous month, properly sworn to by him, and shall quarterly pay into the state treasury, on the first day of January, April, July and October of each year, the amount of license fees payable by law into such treasury.

SEC. 2587. *Records—compensation.*—The books, accounts, vouchers and funds belonging to or kept by said board of pharmacy shall at all times be open or subject to the inspection of the governor, or any committee appointed by him. Each commissioner of pharmacy shall receive as full compensation for his services the sum of \$5 for each day actually employed in the discharge of his official duties, together with his actual traveling expenses in performing said duties, all of which shall be paid from the fees of the office, and each commissioner shall file with the auditor of state, at the end of each quarter of his official year, an itemized statement under oath of his actual time in days employed in the discharge of his duty and traveling expenses incurred in the performance of his duty for such quarter.

SEC. 2588. *Registered pharmacists.*—No person not a registered pharmacist shall conduct the business of selling at retail, compounding or dispensing drugs, medicines or poisons, or chemicals for medicinal use, or compounding or dispensing physicians' prescriptions as a pharmacist, nor to allow anyone who is not a registered pharmacist to so sell, compound or dispense such drugs, medicines, poisons or chemicals, or physicians' prescriptions; except such as are assistants to and under the supervision of one who is a registered pharmacist, and physicians who dispense their own prescriptions only; but no one shall be prohibited by anything contained in this chapter from keeping and selling proprietary medicines and such other domestic remedies as do not contain intoxicating liquors or poisons, nor from selling concentrated lye or potash having written or printed on the package or parcel its true name and the

word "poison," sales of which need not be registered. Whoever violates either provision of this section, for the former shall pay \$5 for each day of its violation, to be recovered in an action in the name of the state, brought by the county attorney under the direction of the commission, and for the latter shall be guilty of a misdemeanor, and punished accordingly. In actions or prosecutions under this chapter, it need not be proven that the defendant has not a pharmacist's certificate, but such fact shall be a matter of defense.

SEC. 2589. *Examinations—registration.*—The commission, at such times and places as it may select, and in such manner as it may determine upon, shall examine all persons desiring to engage in and conduct business as registered pharmacists, as contemplated in the preceding section, and, if found competent, the applicant's name shall be entered in the registry book of certificate holders. ("Graduates of pharmacy holding a diploma from the State University, or from any school or college of pharmacy requiring a course of study and laboratory work equivalent to that prescribed by the said State University in its catalogue for the year 1897-98, may be registered without examination.") (Pharmacists thus registered have the sole right to keep and sell all medicines and poisons except intoxicating liquors.)

SEC. 2590. *Registration and examination fees.*—Each person furnished a certificate and registered without examination shall pay to the commission \$2, and each and every person whom they examine orally, or whose answers to a schedule of questions are returned subscribed to under oath, the sum of \$5, which shall be in full for all services. And in case the examination of said person shall prove defective and unsatisfactory, and his name not be registered, he shall be permitted to present himself for reexamination within any period not exceeding twelve months next thereafter, and no charge shall be made for reexamination. The said commissioners are authorized to administer oaths pertaining to their said office and take and certify the acknowledgments of instruments in writing. After registration, an annual fee of \$1 for a renewal certificate shall be paid on or before the 22d day of March by all pharmacists who continue in business, and the conduct of such business without such renewal shall be a misdemeanor.

SEC. 2591. *Registry book—certificate displayed.*—The commission shall keep a registry book in which shall be recorded the

names and places of residence of all certificate holders, with the date of such certificate, which shall hold good for one year, and no longer without renewal. Renewals shall be granted upon the payment of the annual fee fixed in the preceding section. Should a certificate holder change his residence, upon notice thereof such change shall be noted in the registry book. Each certificate holder shall keep displayed in his place of business his registration certificate. A failure to comply with this requirement shall be a misdemeanor.

SEC. 2592. *Sale of adulterated drugs.*—Registered pharmacists shall be responsible for the quality of all drugs, chemicals and medicines which they may sell or dispense, except those sold in the original packages of the manufacturer, and those known as patent medicines. If any such pharmacist shall knowingly adulterate or cause to be adulterated any drugs, chemicals or medical preparations by him kept for sale or sold, he shall be guilty of a misdemeanor.

SEC. 2593. *Sale of poisons.*—No person shall sell at retail any poisons enumerated in schedules A and B, except in dispensing poisons in usual quantities or doses upon the prescription of a physician as follows: Schedule A, arsenic and its preparations, corrosive sublimate, white precipitate, red precipitate, biniodide of mercury, cyanide of potassium, hydrocyanic acid, strychnia and other poisonous vegetable alkaloids and their salts, essential oil of bitter almonds, opium and its preparations except paregoric and other preparations of opium containing less than two grains to the ounce. Schedule B, aconite, belladonna, colchicum, conium, nux vomica, henbane, savin, ergot, cotton root, cantharides, creosote, digitalis, and the pharmaceutical preparations, croton oil, chloroform, chloral hydrate, sulphate of zinc, mineral acids, carbolic acid and oxalic acid; unless the package containing such poisons has placed thereon, and also on the outside wrapper or cover, the name of the article, the word "poison" and the name and place of business of the seller; nor sell or deliver such poison unless upon due inquiry it be found that the party receiving it is aware of its character and represents it is to be used for proper purposes; nor sell or deliver any of the poisons included in schedule A without also, before delivery of the same, causing an entry to be made in a book kept for that purpose, of the date of sale, the name and address of the purchaser, the name of the poison, the purpose for which it was represented to be required, and the name of the dispenser,

which book shall be open to inspection by the proper authorities and preserved for at least five years, the entry of each such sale to be signed by the dispenser. Any person violating any of the provisions of this section, except as otherwise provided by law, shall be adjudged guilty of a misdemeanor and be punished by a fine of not less than \$25 nor more than \$100, or by imprisonment in the county jail for not less than thirty days nor more than sixty days, or by both fine and imprisonment, in the discretion of the court.

SEC. 2594. *Itinerant vendors of drugs.*—Any itinerant vendor of any drug, nostrum, ointment, or appliance of any kind for the treatment of any disease or injury, and all those who by any method publicly profess to treat or cure diseases, injury, or deformity, shall pay to the treasurer of the commission of pharmacy an annual fee of \$100, upon the receipt of which the secretary of the commission shall issue a license for one year from its date; \$2,000 annually of the money arising from the license fund, or so much as may be needed, shall be devoted to defraying the expenses of the commission, and any balance remaining shall be paid into the state treasury. Said commission shall, on the first day of January of each year, make a verified and itemized statement in writing to the auditor of state, of all receipts and expenditures of money coming into their hands by virtue of their office. Any violation of this section shall be a misdemeanor, and any person shall, upon conviction thereof, pay a fine of not less than \$100, nor more than \$200. In actions or prosecutions under this chapter, it need not be proven that the defendant has not a license, but such fact shall be a matter of defense.

SEC. 2595. *Penalty for false representation.*—If any person shall procure or attempt to procure a certificate of registry for himself or another by means of false representations or device, or without being a registered pharmacist shall conduct a place for retailing, compounding or dispensing drugs, medicines or chemicals, or for compounding or dispensing physicians' prescriptions, or shall use or exhibit the title of registered pharmacist, and each several day a place shall be so used shall be held to be a separate and several offense.

SEC. 2596. *Revocation of certificate.*—When a registered pharmacist has been convicted of a violation of the provisions of this chapter, in addition to the other penalties provided by law, the commission, in its discretion, may revoke his certificate of registry.

OFFICIAL FORMS.

*In accordance with Chapter 6, Code of 1897, adopted October 11, 1897.
(See Regulation No. 13.)*

[OFFICIAL FORM A.]

PUBLICATION NOTICE OF APPLICATION FOR PERMIT.

*In the District (or Superior) Court of the State of Iowa.....County
(or City):*

*In the matter of the application of.....
a registered pharmacist, for a permit to buy, keep }Term, 189..
and sell intoxicating liquor.*

NOTICE.

To Whom it May Concern: Notice is hereby given that the application of the undersigned.....a registered pharmacist, No.....doing business under the firm name of....., of....., in county of....., State of Iowa, praying for a permit to buy, keep and sell intoxicating liquors (*particularly describe the locality*)..... in county of....., State of Iowa, will be on file in the office of the Clerk of the District (or Superior) Court of said county (or city) on or before theday of....., 189..., and that said cause will come on for hearing in said court at theterm of said court, to be begun and held at..... on the.... day of....., 189...., *Applicant.*

[OFFICIAL FORM B.]

PETITION FOR PERMIT.

*In the District (or Superior) Court of the State of Iowa, in and for.....
County (or City).*

*In the matter of the application of.....
a Registered Pharmacist, to buy, keep and sell }Term, 189..
intoxicating liquors.*

Comes now....., a Registered Pharmacist, and prays that he be granted a permit to buy, keep and sell intoxicating liquors for lawful purposes at the place hereinafter designated, and in support of this petition, alleges:

1st. That he is a citizen of the United States, the State of Iowa, and a resident of.....county, that he is now engaged in the business of.....and for the two years next prior to the filing of this petition he has been engaged

In the business of....., that he is a Registered Pharmacist No., of the State of Iowa, doing business under the firm name of....., that his certificate of Registration is in full force and effect for the town of..... and that he is now and for the last six months has been lawfully conducting a pharmacy in.....township (or town of.....), in the county of..... and State of Iowa, as proprietor of such pharmacy, and that he has not been adjudged guilty of violating the laws relating to intoxicating liquors within the last year next preceding the filing of this petition, that he is not the keeper of a hotel, eating house, saloon, restaurant or place of public amusement, that he is not addicted to the use of intoxicating liquors as a beverage, and that he desires a permit to purchase, keep and sell such liquors for lawful purposes only, and that said business is to be conducted at..... Iowa, No., street (or) lot....., (block).....in said.....county.
.....Applicant.

STATE OF IOWA, }
.....COUNTY. }

I,, first being duly sworn depose and say that I am the applicant named in the foregoing petition, that I have read the foregoing, my petition herein, and know the contents thereof, and that all the allegations thereof are true as I verily believe.

Subscribed in my presence and sworn to before me by the said.....
....., on this.....day of....., A. D. 189..

....., Notary Public.

[OFFICIAL FORM C]

BOND.

Know all men by these presents, that we,as principal and.....as sureties, are held and firmly bound unto the State of Iowa in the penal sum of one thousand dollars, for the payment of which we bind ourselves, our heirs, executors and administrators.

The condition of this obligation is such that, whereas, the above boundwas on the.....day of.....189.., by the District (or Superior) Court of.....county (or city), State of Iowa, granted a permit to buy, keep and sell intoxicating liquors for lawful purposes at (particularly describe the place)..... Now, if the saidshall well and truly observe and obey the laws of Iowa, now or hereafter in force in relation to the sale of intoxicating liquors, and pay all fines, penalties, damages and costs that may be assessed or recovered against him for the violation of such laws during the time of the continuance of said permit, then this bond to be void, otherwise to be and remain in full force and effect.

Signed this.....day of....., A. D. 189..

....., Applicant.

.....
.....

STATE OF IOWA, }
.....COUNTY, } ss.

I,, do solemnly swear (or affirm) that I will well and truly

perform all and singular the conditions of the within bond, and keep and perform the trust confided in me to purchase, keep and sell intoxicating liquors. I will not sell, give or furnish to any person any intoxicating liquors otherwise than as provided by law, and especially, I will not sell or furnish any intoxicating liquors to any person who is not known to me personally or duly identified: nor to any minor, intoxicated person or persons who are in the habit of becoming intoxicated; and I will make true, full and accurate returns of all certificates or requests made to or received by me as required by law; and said returns shall show every sale and delivery of such liquors made by or for me during the months embraced therein, and the true signature to every request received and granted; and such returns shall show all the intoxicating liquors sold or delivered to any and every person as returned.

Subscribed in my presence and sworn to before me by the said.....
on this.....day of....., A. D. 189...

.....
Clerk of the Court.

(To go on back of bond.)

QUALIFICATIONS OF SURETIES.

STATE OF IOWA, }
COUNTY, } ss.

We, the undersigned, first being duly sworn, depose and say, and each for himself deposes and says that he is one of the sureties whose name is subscribed to the within and foregoing bond; that he is a resident of the State of Iowa; that he is worth double the sum secured by said bond beyond the amount of his debts and liabilities, to-wit: the sum of.....dollars; and that he has property liable to execution in said State equal to the sum secured in said bond, to-wit: the sum of.....dollars.

.....

 Subscribed in my presence and sworn to before me by.....
 this.....day of....., A. D. 189...

.....
Clerk of the Court.

 [OFFICIAL FORM D.]

PERMIT.

Whereas,, a registered pharmacist, of the State of Iowa, Certificate No....., (of the firm of).....
 did on the.....day of....., A. D., 189..., publish his notice and file in the office of the clerk of the district (or superior) court in and for.....county (or city), Iowa, his petition and bond, as provided by chapter 6, Code of 1897, for a permit to buy, keep and sell intoxicating liquors for pharmaceutical and medicinal purposes, alcohol for

specified chemical mechanical purposes, and wine for sacramental purposes, but for no other purpose whatever, in the (township, town or ward) of..... (*describe street, block and number*) in the county of....., State of Iowa.

And it appearing that the said Registered Pharmacist's Certificate of Registration, No....., is in full force and effect for the town of....., above mentioned, and in accordance with the pharmacy law of the State of Iowa, and the court being duly satisfied that the requirements of the law have in all respects been fully complied with, and that said applicant is entitled to a permit as provided by chapter 6, Code of 1897, it is ordered that he be and is hereby authorized, from and after theday of....., 189..., to buy, keep and sell intoxicating liquors for pharmaceutical and medicinal purposes, and alcohol for specified mechanical purposes, and wine for sacramental purposes, but for no other purpose whatever, at the place aforesaid, so long as his Certificate of Registration is in full force and effect, or until this permit is otherwise revoked according to law.

.....
Clerk of District (or Superior) Court,
..... County (or City), Iowa

REQUEST OF PURCHASERS.

-----, Iowa, -----189-----

To -----
Reg. Phar. No.-----

I hereby make request for the purchase of the following liquors:

AMOUNT.	KIND.
-----	-----
-----	-----

My true name is-----, I am not a minor, and I reside in ----- township (or town) of -----,
at No.-----, in the county of-----, State of----- The actual purpose for which this
(If for applicant, say myself; if for another give name, age and residence.)

request is made is to obtain the said liquor for-----
and the same is desired for----- use, and neither myself nor the said
----- habitually uses intoxicating liquors as a beverage.

(Signature of purchaser)-----

Attested by-----

Reg. Phar. No.-----

CERTIFIED REQUEST OF PURCHASERS.

-----Iowa-----189-----

To-----Reg. Phar. No.-----

I hereby make request for the purchase of the following intoxicating liquors:

AMOUNT.	KIND.
-----	-----
-----	-----

My true name is-----, I am not a minor, and I reside in-----township (or town) of-----
at No.-----, in the county of-----, State of----- The actual purpose for which this request is
made is to obtain the said liquor for-----
and the same is desired for----- use, and neither myself nor the said-----
habitually uses intoxicating liquors as a beverage.

(Signature of purchaser)-----

I, -----, hereby certify that I am acquainted with-----, the applicant for the
purchase of the foregoing described liquors, and that said----- is not a minor and is not in the habit
of using intoxicating liquors as a beverage and is worthy of credit as to the truthfulness of the statements in the fore-
going request, and my residence is-----, No.-----, Street-----

(Signature of certifier)-----

Attested by-----

Reg. Phar. No.-----

[OFFICIAL FORM G.]

PERMIT HOLDER'S BI-MONTHLY STATEMENT TO COUNTY AUDITOR OF PURCHASES, SALES AND USE
OF INTOXICATING LIQUORS.

For the month of..... and....., 189..

OF WHOM PUR- CHASED	DATE OF RECEIPT.	AMOUNT PUR- CHASED.			KIND.	AMT. ON HAND AT COMMENC'T OF THE MONTH OF			TOTAL ON HAND AND RECEIVED.			AMOUNT SOLD			AMOUNT USED.			AM'T ON HAND AT THE END OF THE MONTH OF		
		Gals.	Qts.	Pts.		Gals.	Qts.	Pts.	Gals.	Qts.	Pts.	Gals.	Qts.	Pts.	Gals.	Qts.	Pts.	Gals.	Qts.	Pts.
-----	-----	-----	-----	-----	Alcohol	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	Whisky	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	Brandy	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	Gin	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	Wine	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

STATE OF IOWA, } ss.
COUNTY.

I,, Reg. Phar. No. of town, county, State of Iowa, being
duly sworn, on oath depose and say that the above and foregoing statement of purchases, aggregate sales and uses of intoxicat-
ing liquors, under my permit for the months of and, 189.., is a true and correct statement as I verily believe.

Subscribed in my presence and sworn to before me by..... on this
..... day of, A. D. 189..

County Auditor or Notary Public.

[OFFICIAL FORM H]

PERMIT-HOLDER'S BI-MONTHLY REPORT OF REQUESTS AND
AFFIDAVIT.

STATE OF IOWA, }
.....COUNTY, } ss.

I....., Reg. Phar. No....., being duly sworn on oath state that the requests for liquors herewith returned are all that were received and filed at my pharmacy (or place of business) under my permit during the months of.....and....., 189..., that I have carefully preserved the same and that they were filled up, signed and attested at the date shown thereon as provided by law, that said requests were filled by delivering the quantity and kind of liquors required and that no liquors have been sold or dispensed under color of my permit during said months except as shown by the requests herewith returned, and that I have faithfully observed and complied with the conditions of my bond and oath taken by me thereon endorsed, and with all the laws relating to my duties in the premises.

STATE OF IOWA, }
.....COUNTY, } ss.

I,, Reg. Phar. No....., first being duly sworn, depose and say that I am clerk for....., and that no liquors have been sold, dispensed or disposed of by me, in any manner, during the months of.....and....., except as shown by the requests attested by me, filed herewith and included in the report of the said.....

STATE OF IOWA, }
.....COUNTY, } ss.

I,, Reg. Phar. No....., first being duly sworn, depose and say that I am clerk for....., and that no liquors have been sold, dispensed or disposed of by me, in any manner, during the months of.....and.....except as shown by the requests attested by me, filed herewith and included in the report of the said.....

The foregoing statement (was or were) subscribed to in my presence, as indicated therein, and sworn to before me by the said.....and said.....and said.....on this.....day of....., A. D. 189..

.....
County Auditor or Notary Public.

CERTIFICATE.

OFFICE OF THE COMMISSIONERS OF PHARMACY }
FOR THE STATE OF IOWA. }

I, Chas. W. Phillips, Secretary of the Commission of Pharmacy for the State of Iowa, having custody of the register and records of the Commission, hereby certify that the regulations, opinions, forms and notices herein contained are true and correct copies of the original official regulations, forms, notices, and opinions on file in this office.

In testimony whereof I have hereunto set my hand and
affixed the seal of the Commission. Done at Des
[SEAL.] Moines, this 15th day of September, 1899.

CHAS. W. PHILLIPS,
Secretary of the Commission.

JAMES I. GIBSON
State Veterinary Surgeon

Second Biennial Report

OF THE

Veterinary Surgeon

OF THE

State of Iowa

TO THE

Governor of Iowa

FOR THE

PERIOD ENDING JUNE 30, 1899

PRINTED BY ORDER OF THE GENERAL ASSEMBLY

DES MOINES:
F. B. CONAWAY, STATE PRINTER
1899

LETTER OF TRANSMITTAL.

To Leslie Mortier Shaw, Governor of Iowa:

I have the honor to transcribe to you herewith, in accordance with law, the second biennial report of the office of the state veterinary surgeon, for the term ending June 30, 1899.

Respectfully,

J. I. GIBSON.

REPORT.

I have the honor to submit the following report of the work accomplished by the veterinary department during the biennial period ending June 30, 1899, together with the financial exhibit for the same period.

The work of the department increases as the great state of Iowa grows and develops in animal husbandry, and as the Iowa live stock breeder and feeder become more enlightened on the subject of diseases of animals, their prevention and control by the practical application of veterinary sanitation, which is the outgrowth of scientific investigation.

The people of this generation in Iowa believe in the preventive methods in vogue as being better suited to their needs than all the so-called cures of the past. To-day we are able by vaccination to produce immunity to a number of the heretofore most fatal contagious and infectious diseases of animals; and scientists are at work with other vaccines which will doubtless prove as effectual as those now made use of to the entire satisfaction of the live stock owners of the state.

The discovery of the first immunizing vaccines was semi-accidental, but from a knowledge of these the scientist of to-day can take the virus of any transmissible disease; isolate the germ; study and learn its nature; and then proceed to produce a vaccine or inoculative serum which produces immunity in some degree. To produce absolute immunity, it would be necessary to remove the conditions which favor the progress of disease, as well as to vaccinate the animal which furnishes the favorite soil for the culmination of the germ life, which is the disease. This is especially true in connection with the serum therapy in hog cholera. The use of the serum together with anti-cholera conditions of the premises will prove quite satisfactory, but the use of anti-cholera serum together with pro-cholera conditions of the premises, will not prove satisfactory.

Monona, Warren and Woodbury. In these four outbreaks about eighty-five animals died, which shows how fatal this disease is. In Sioux City five men became inoculated with the disease, which made the matter appear very serious, and assisted us in securing obedience to all quarantine restrictions. Dr. Smith, one of the victims, was so seriously ill that for days his life was despaired of, but with the most scientific treatment and careful nursing he was restored to health.

Dangerous and dreaded as this disease is, science has found in vaccination a successful remedy, which is coming into general use in the infected districts of Europe and America.

GLANDERS.

During this period we have received thirty-two calls to investigate outbreaks of glanders and farcy, and have diagnosed forty-four cases, located in the following counties, viz.: Adair, Buchanan, Hancock, Emmet, Humboldt, Hamilton, Mahaska, Monona, Poweshiek, Sioux, Shelby, Van Buren and Winne-shiek. This disease is apparently on the decrease, largely, I believe, the result of the use of the mallein test, which often condemns latent or chronic cases which do not present sufficient clinical symptoms on which to condemn the animal.

The following excellent paper by Dr. John E. Brown, assistant state veterinarian, Oskaloosa, Iowa, is strongly recommended to the readers of this report as a practical production which will certainly prove highly instructive to all who read it:

GLANDERS AND MALLEIN.

Our farmers and horsemen have been educated from infancy to a fear of glanders, such as they feel for no other animal disease.

Only mention the fact that a certain horse is suspected of being afflicted with that disease, and every other horse owner in the country is at once demanding an immediate investigation of the case.

This being true, there is little probability that the disease will ever be permitted to spread to the extent of interfering seriously with the horse industry of Iowa, and were it not for the itinerant professional bum horse traders that infest our country, the disease would soon be stamped out in Iowa.

These traders, in their wanderings over the country, find and come into possession of glandered horses because they are known to be diseased and are cheap—they get them for almost

nothing—propably get them before the disease has made much progress, and before any general suspicion has been aroused.

They then become trading stock, and are peddled over the country from place to place, carrying the seed of infection wherever they go.

Usually these cases are imported into our state by the class of humanity commonly known as "movers," who go through the country with their families in covered wagons, driving and leading a lot of old, scrubby, half starved, worn out or diseased horses. These are the outfits that I would especially warn our citizens against.

Many people have an idea that glanders is a disease of spontaneous origin, or that it may develop from some other disease of long standing, but such is *not* the case. Glanders is a specific disease, due to a specific bacilli, and before an animal becomes so diseased it must become inoculated with the bacilli from a glandered animal. In other words, the disease must be transmitted, directly or indirectly, from one animal to another.

By indirectly I mean that the virus from a glandered horse may be left where it may be taken up at some future time by the healthy horse, and the disease again become established.

In proof of the statement that the disease is usually imported into our state as described, I will review hastily the history of a few cases that have come under my own personal knowledge.

A year or so ago as I was passing along a street, my attention was arrested by the peculiar, noisy, snuffling breathing of two horses standing together at a hitch-rack. There is that peculiar sound emitted by the breathing of animals in which the disease is well developed, that the experienced ear is not likely to be deceived in. It is due to the ulcerated and thickened condition of the mucus membranes that line the nasal passages. In both these cases the disease was well developed. The owner of the team was soon found, and he told us that he obtained them only a short time before from some people who said they came from Missouri.

One evening last fall a Swede brought a horse to my office and asked if I could cure him. I soon found that it was a case of glanders with a history, as nearly as I could learn, like this: Some three or four years before, some movers from Kansas came through the country and traded this horse to a colored man. It was afterward kept with and worked with another horse that the colored man had raised, until a few weeks before, when the Swede bought it. The horse was destroyed, and instructions issued to have the other horse examined. It was found standing in the stable where the two had previously been kept together. Apparently it was enjoying good health. On close examination we found the mucus membranes lining the nostrils slightly discolored, and a few tears trickled down the face from the left eye. Otherwise nothing abnormal could be detected by physical examination. The circumstances attending

the case, however, made it very suspicious, and it was decided to employ the mallein test, and to this test a reaction of temperature of three and three-fifths degrees occurred, establishing, unquestionably, the fact that the disease existed.

Another item of interest in this case is that some time after the colored man came into possession of the horse that he got from the mover, he (the man) became afflicted with, and finally died from the effects of, a disease the attending physician called consumption, but from the history we learned of the case we have good reason to believe was glanders, and that it was transmitted from the horse to the man. Several other cases of the transmission of the disease from horses to man have occurred in Iowa during the past few years.

From this last case it is shown that it is not always an easy matter to detect the presence of the disease in horses by physical examination.

Four years ago a pony was brought to my office for examination. There was the least bit of a watery discharge from one nostril, but nothing else abnormal could be detected. During the winter following the pony was kept in a box stall along with a two-year old colt, and without any other chance of exposure the colt developed a well-marked case of glanders the next spring. I never saw the pony afterward, for it was traded off during the latter part of winter, but the owner told me it never showed any more marked signs of disease.

There are many just such cases of glanders, not sufficiently well marked to create a well grounded suspicion—others a little farther developed, yet not sufficiently so to differentiate from some other condition, or to pronounce glanders from physical examination alone. Such cases, when the slightest suspicion exists, or when they have been known to have been exposed, should be tested at once by the mallein test. True, it does not always follow that every exposed animal becomes infected, but no chances should be taken.

Glanders is not as virulently contagious as is generally believed, and is not a disease that is likely to spread as rapidly as some other contagion, because, as before stated, can only be spread by absolute inoculation. It would be possible for a horse to stand in an adjoining stall to a case of glanders and not become inoculated. The infection is not likely to be carried through the medium of the atmosphere, but the inoculation more commonly occurs by the healthy horse standing at the hitching post or feed manger on which the virus from the glandered horse has been left. Then, in biting the post or manger, a slight abrasion is made in the soft mucus membranes of the gum, through which the germs of the disease are absorbed, and passing into the circulation, they are carried and lodged in the animal tissues which favor their growth and development, and the disease is established.

By this time most of our stockmen have become familiar with the tuberculin test as used in cattle to determine whether or not the disease known as tuberculosis exists. The mallein test to determine whether or not glanders exists in a horse, is on exactly the same principle, and is conducted in the same manner. Mallein is produced from the glanders bacilli similarly as is tuberculin from the tubercle bacilli. It contains no live germs, and no danger can possibly result from using mallein in the healthy horse. Its value as a diagnostic agent in obscure cases is recognized and it is fully endorsed by all the leading authorities in the veterinary profession. When we recognize that glanders is an incurable contagious disease in the horse, transmissible from the horse to mankind, we must also recognize the great value of any agent that will aid us in its early detection, thereby enabling us to cut short the source of its spread.

ACTINOMYCOSIS.

Is a disease due to a vegetable fungus, and is commonly called lumpy jaw. In the past much was said and many articles written about this disease, but to-day we hear very little about it. A specific has been found in the iodide treatment, which, if properly and promptly administered, will prevent any serious loss of property from this disease.

During this biennial period the department was called upon twice to investigate cases of actinomycosis of the tongue, in which form the disease is called "wooden tongue." These cases were found in Carroll and Crawford counties, and responded readily to the iodide treatment.

BLACKLEG.

During the period covered by this report, outbreaks of black leg have been discovered in the following named counties: Crawford, Dallas, Greene, Jasper, Page, Plymouth, Tama, Union and Wapello. In all about fifty-nine animals died. The local veterinary practitioners are now being called upon to vaccinate young cattle, where pastures are known to be infected, and as a result the loss of property from this disease is not nearly as large as in former years before the merits of vaccine were known.

Blackleg is an infectious disease, more particularly of young cattle, which used to be classed with anthrax, but now is known to be the result of a distinct germ, which, though resembling the bacillus of anthrax, is somewhat different. The bacillus of blackleg is rod-like, but enlarged at one end so as to appear somewhat club-shaped. At this larger end will be found the spore of the bacillus, which has similar powers of endurance and resistance to those of the anthrax bacillus. In this disease we have tumors or swelling peculiar to the disease, hence its name. The swelling is sometimes very extensive, embracing the entire region of the hips or shoulders. It may appear about the neck or throat. It never extends below the knee or hock. You are doubtless all familiar with the peculiar rattling or crackling sound heard when stroking the swelling. This disease is not considered transmissible from one animal to another, or rather, is not often communicated in that way, although to remove the hide from an animal dying with blackleg and allow the carcass to remain, the spores may be transmitted to other animals, through the atmosphere, vegetation or water. The disease generally spreads from the improper disposal of carcasses of one outbreak which allows the spores to be deposited in the soil, and from it to get into the grass and thus cause another outbreak. Animals have been known to develop the disease from grazing over the grave of an animal which died of blackleg seven years before. Therefore, as in anthrax, all animals dying of blackleg should be cremated, together with excreta, litter and contaminated soil.

INFECTIOUS CATARRHAL PNEUMONIA.

This disease has been quite common in Iowa during the last two years. It is in symptoms similar to non-infectious pneumonia or inflammation of the lungs, but may pass through an entire herd of cattle or horses by infection, therefore it must be caused by a specific germ. This germ was identified by Shutz, and is named "the bacterium of Shutz." The period of incubation is from fifteen to thirty days. During this biennial period a great many young cattle and calves have been shipped into Iowa, and during the summer and fall of 1898 this disease caused greater loss to cattle owners than any other. It appeared then that a number of the largest stockyards in the

country were infected. In one instance, part of a shipment of young cattle was unloaded in the stockyards and the balance shipped through directly to Iowa. Those unloaded and kept in the yards a day or two had a severe run of the disease, while those that were shipped right through to their destination did not have the disease.

For a description of the disease, I cite you to the previous report, in which you will find a very able article from the pen of Dr. W. B. Niles, assistant state veterinarian.

During this biennial period outbreaks of this disease have been seen in the following named counties: Butler, Clarke, Calhoun, Jasper, Sac, Story, Union and Woodbury. In the above outbreaks fifty two deaths were reported, which, however, does not give a fair estimate of the loss, which was much larger.

DIPHTHERIA IN HORSES.

The following letter will prove interesting and instructive to all who read it. This disease is of rare occurrence, hence the value of an able description like that contained in the following letter:

Dr. J. I. Gibson, State Veterinarian, Denison, Iowa:

DEAR SIR—In the fall of 1898 a disease broke out among the horses on a farm two miles southwest of Dedham, Carroll county. The symptoms being out of the general line of diseases, called for more than a casual observation.

The colts referred to were in good condition, had good water to drink, and were allowed to run at large, sheltered by straw sheds, snow covering the ground to the extent of a foot or more; the cornstalks were their principal food except where they dug down and ate the frozen grass.

The first symptom observed by the owner was a severe chill, which lasted for two or three hours, followed by a marked debility and great depression; the pulse was imperceptible; temperature, 104; the pupil dilated and the animal had a languid appearance. The breath had a fetid, diphtheritic smell; when the animal was moved it had a stiff, staggering gait. The general symptoms led one to suspect anthrax, but the post mortem revealed the disease to be something of diphtheritic nature.

Four animals having been affected, one being dead, a post mortem was held; a red, frothy substance was issuing from the nostrils and a bloody water from the anus. The trachea was filled by a white mucous coat, which extended down to the bronchial tubes; the lungs were slightly congested. The small intestines were also filled with the white mucous coating, extending back to the great colon. The blood was a very dark color,

and apparently coagulated very slowly; small dark spots covered the tongue, and wads of hay filled the mouth, which the animal had attempted to swallow, but owing to paralysis of the pharynx was unable to do so.

Two of the animals recovered and the rest died, all being affected about the same time. One died about fourteen hours after being affected; the other lingered for several days, and I believe would have recovered under treatment, had he not been removed to an adjoining farm on a cold day.

Yours truly,

S. H. JOHNSON,
Carroll, Iowa.

ERGOTISM.

This affection is due to the continued effects of ergot in the system. Ergot is most plentiful in grasses grown upon rich soil, in hot, damp seasons. It is a disease of fungoid nature, and is easily identified among healthy grasses. It affects the seeds in and when thus affected the seed is much larger than usual, and particular, of a black color. Its action on the animal is to weaken circulation in the parts farthest from the heart until circulation is entirely arrested, when death of the parts occurs. A distinct line of demarkation is drawn around the extremity at which point sloughing occurs, and in many cases nature amputates or disarticulates as perfectly as the most skilled surgeon. Upon presentation of the first symptoms, the food should be carefully examined and if ergot is found present a complete change of diet should be substituted.

During this period ergotism has developed in the following counties, viz., Appanoose, Marshall, Webster and Woodbury. In the Woodbury county outbreak, the writer saw fifty-six steers, one and two years old, with one or more feet amputated by the process of gangrenous sloughing. Some had all four feet amputated and were helpless sufferers indeed. These steers were shipped from South Dakota just before coming down with the disease.

ENCEPHALITIS,

Is inflammation of the brain and its coverings. It is caused by external injury or by eating food containing poisonous matter, such as ergot or other vegetable fungi. The symptoms of this disease resemble those of a mild case of rabies, and may easily be mistaken for rabies. A horse suffering from a severe

attack of encephalitis will at times strike, kick, rear and bite as though suffering from rabies. A cow will bellow, hook, push the head against the stall or other enclosure, and even chase a person, when afflicted with this disease. In the first stages we often find diarrhoea, in which instance the fecal matter is black in color, and emits a foul odor. Most cases in cattle are fatal, but in horses we have known of a number of recoveries. It is of the greatest importance that the nature of the disease be determined at once, and a change of diet instituted, together with professional treatment.

During this period outbreaks of this disease have occurred in the counties of Appanoose, Crawford, Clay, Jasper, Tama and Union.

SPECIFIC OPHTHALMIA.

This disease has become quite prevalent throughout the west in the last two years. For several years past the ranchmen have called it sore eyes, from dust, and our cattle dealers believed that to be the cause until the disease came home to them, when they found that dust had little, if anything, to do with causing the disease.

It is not fatal in its results, but causes considerable loss to the cattle owners of Iowa because of the unthriftiness of a herd while passing through the attack, which lasts from two to four weeks in most cases. In some instances total and permanent blindness results, although in ordinary cases there is only slight feverishness with opacity of the cornea for from ten days to two weeks.

During this biennial period the department has investigated outbreaks of this disease in the following counties, viz.: Cass, Hardin, Palo Alto, Tama and Wayne.

In addition to these calls we have had a great many letters from owners or afflicted herds, describing the symptoms and asking for a diagnosis and treatment. While it is certainly the result of a specific germ, it is not serious because it does not imply the loss of animals, as most infectious diseases do. The affected animals should be isolated and kept in darkened barns during the bright sunlight of the day which seems to cause greater suffering in this as well as most affections of the eyes.

RABIES.

During this biennial period outbreaks of rabies have been investigated in the counties of Bremer, Iowa, Johnson and Plymouth. So far as reported there were seven cows, three horses and one dog died, and we have reason to believe that there were many more deaths which were not reported. Since this is a fatal disease, and there is no remuneration for the loss of live stock caused by the bite of a mad dog, it becomes one and all to see to it that no dogs are allowed to run at large, especially when a mad dog has been known to have roamed through a township.

The following list of rules adopted by the township board of Sumner township, Iowa county, will serve as a lesson to other boards who fear they have no power to act. The rules are excellent, and we commend the board's action in adopting them

Notice is hereby given that, in accordance with the provisions of section 2568 of the revised code, the following rules and regulations relating to rabid animals have been adopted by the board of health of Sumner township, and are in full force on and after the date of their publication, and until further notice:

1. All dogs and hounds shall be restrained from running at large in the township unless securely muzzled, so as to prevent the possibility of their biting any person, dog or other animal.

2. All dogs or other animals known to have been bitten by any rabid animal shall be killed and deeply buried or burned, except horses and cattle, which may be confined and given preventive treatment if desired; but it should be borne in mind that one animal may inoculate an entire herd by deposits of saliva upon the grass and in barns and other places of feeding. In any case the animal must be killed when the disease has developed.

3. Dogs and hounds suspected of having been exposed to other rabid animals must be killed at once, or confined from other animals or persons for at least eight weeks, after which they may be muzzled as in rule 1.

4. No person shall bring into the township any dog or hound, or permit any dog or hound belonging to them to enter the township except it be muzzled, as in rule 1, and it shall be the duty of any person finding any dog or hound running at large which is not so muzzled to kill it at sight, whether upon their premises, the public roads of the township or other place in the township, except the owner's premises.

Any violation of these rules is subject to a fine of \$25, and good citizens are requested to prosecute all offenders.

W. H. BETZ,
Clerk.

W. M. BLAIR,
J. B. BETZ,
Board of Health, Sumner Township.

The following paper, written by John W. Griffith, assistant state veterinarian, of Cedar Rapids, Iowa, will prove very interesting to all who read it:

There have been several outbreaks of Rabies during the year, one of which I will report here.

In Sumner township, Iowa county, on March 25th, there was seen in the neighborhood a strange dog biting several dogs, as well as a horse, some cows and pigs.

Mr. Bower had one horse bitten, which took the disease, and the diseased horse before dying bit a colt, and Mr. Bower on the hand. He immediately went to Chicago and took the Pasteur treatment. He staid two weeks and at the time of writing is at home and feeling well. His colt that was supposed to have been bitten is apparently well at the time of writing.

Mr. Shetenhelm has lost one horse, one cow and two hogs from the disease. Mr. Hillman lost one cow.

They shot ten dogs in that locality that had been bitten. They did not wait to see the disease develop, as they considered the chances too great a risk to run. All dogs that are not muzzled, running in Sumner township, are shot, and large notices are posted up in the township to that effect.

RABIES, OR HYDROPHOBIA,

Is a disease of the nervous system, characterized by little or no fever, a high degree of irritability and excitement, the presence of spasms, and a disposition to bite, great prostration and finally death.

It was called hydrophobia on account of the inability on the part of the sufferer to drink water, which inability was supposed to be caused by dread of the liquid; however, the rabid animal has not the slightest dread of water, and is only prevented from taking it by spasmodic action of the muscles of deglutition.

Man and all lower animals are liable to this disease, which is of a rather frequent occurrence, and has been prevalent in Iowa county the past two years.

The period of inoculation varies from ten days to six or seven months, and in man, cases have been observed wherein the period of inoculation varied from fifteen days to ten months, and a few cases are recorded wherein several years elapsed after the bite was received before the disease manifested itself.

The disease is caused by a bite from a rabid animal, the virus being left in the wound at the time the bite is inflicted, or from other animals licking the sores on an animal that has the disease.

SYMPTOMS.

Rabies occurs in two forms: a furious, and a dull, morose form, the latter being known as dumb rabies.

Like other brain affections, this disease is preceded by dullness, which is followed by temporary fits of excitement, after which the patient may relapse into the previous condition of dullness, and seek some out-of-the-way place, and suddenly become greatly excited without any apparent cause. Another prominent symptom is a depraved appetite, the animal eating dirt, stones, etc., and will bite and snap at anything coming in his way.

TREATMENT.

After the disease has become manifest, its unavoidable termination is death, hence the animal, instead of being treated, should be destroyed at once.

In case of a valuable animal, or a human being bitten, the wound should be cleansed and thoroughly cauterized at once; caustic in a liquid form being preferable.

Inoculation, practiced by M. Pasteur (the French inoculist) may be performed, and is claimed, will prevent the disease. The experiments up to the present time have been satisfactory.

TEXAS FEVER.

During this period there have been three outbreaks: one in Pocahontas county, confined to one herd; one in the counties of Grundy, Hardin and Marshall, and one in the counties of Cass, Mills, Montgomery, Page and Pottawattamie. In each outbreak quarantine was promptly served on all owners, and no further spread of the disease occurred on any of the premises. The owners also resorted to treatment by picking the ticks off their native cattle and applying oils of different kinds. The ticks must have been of a generation far removed from the virulent Texas fever districts, or our death rate would have been higher. A number of susceptible native cattle from which large numbers of ticks were picked and to which oil was applied, had the disease in mild form and recovered. By quarantining all suspicious cattle and infected pastures, we prevented the further spread of the disease. In the three outbreaks fifty-four farms were placed in quarantine, which fact gives the reader an idea of the work connected with one outbreak spread over three or four counties. We feel sure that the time is not far distant when the dread of this disease will be removed by the use of vaccine or inoculative serum, and then the Iowa farmers may buy southern feeding cattle, and the southern cattle breeder and ranchman may buy thoroughbred bulls and heifers with which to improve his herd from the Iowa breeder, thus establishing a cattle trade between the north and south that will prove beneficial to both sections, because of the prevention of Texas fever and the untold losses resulting therefrom.

The following paper by Hal. C. Simpson, assistant state veterinarian, will furnish the reader a description of this disease and how it is communicated, and will prove of great benefit to Iowa cattle shippers and feeders:

Texas fever is a specific disease communicated by cattle which have recently been moved northward from the infected district and which are the bearers of the cattle tick, *Boophilus bovis*, the cause of the disease. Or is contracted by cattle sent into the infected area and allowed to roam at will, becoming infected by lying on the ground. For this reason valuable breeding animals are hauled many miles and put into corrals that are free from infection.

NATURE OF THE DISEASE.

It is essentially a blood disease, being caused by a micro-organism which lives within the red blood corpuscles, multiplying very rapidly and causing death in a few days by the destruction of red blood cells. Its method of getting into the red corpuscles is unknown, but it must be an exceedingly minute body, endowed with the power of motion, and does not begin to enlarge until after gaining admission. The various disease processes which go on in Texas fever are due to the destruction of the red blood corpuscles, which may be extremely rapid or slow. When rapid, is fatal in most cases. When the destruction of corpuscles is slower, a mild non-fatal type of the disease is present. This is usually seen in the late autumn.

Death is not due so much to the loss of blood corpuscles as to the difficulty the organs have in getting rid of the waste products arising from the wholesale destruction. If we assume that the blood represents one-twentieth of the weight of the animal, and the corpuscles contained in from five to ten pounds may be destroyed in twenty-four hours, the remains of these corpuscles must either be excreted unchanged or converted into bile. The effort of the liver to do this causes extensive disease of that organ. This enormous destruction of corpuscles takes place to a large extent in the kidneys. This accounts largely for the blood colored urine or red water which is a characteristic feature of Texas fever.

SYMPTOMS.

Dullness, loss of appetite and a tendency to get by themselves, caring nothing about being with the rest of the herd. Temperature from 104 to 107, and remains stationary until recovery or death ensues. The higher the fever the more acute the disease, as it indicates the intensity of the diseased process going on within. The bowels are generally constipated during the height of the fever, toward the end the feces becoming softer. The urine shows nothing abnormal until near the fatal termination, when it becomes bloody. This may generally be regarded as an indication of approaching death. The pulse and respiration are more rapid than during health. Emaciation becomes marked, the blood thin and watery, and having no tendency to form a clot. The animal lies down most of the time. The course of the disease varies in duration, death taking place in from three days to several weeks. Those that recover do so very slowly, owing to the great poverty of the blood in red corpuscles. The flesh is regained but slowly, and the animal may be subject to a second mild attack, which may retard recovery until the beginning of winter.

The presence of small ticks on the animal's skin in the region of the thighs, udder, and the escutcheon, is a very important sign, and indicates that the animal has been on infected territory.

On post mortem examination of an animal that has died from Texas fever, the following changes will be found: The spleen enlarged to three or four times its normal size; when held up by one end the contents gradually run to the other end; when cut into, the contents are black in color. The liver is enlarged, has lost its natural brownish color, and has a yellowish hue, due to the biliary injection of the finest capillaries. The gall bladder is distended with bile, which holds a large number of yellow flakes in suspension. The bladder contains blood tinted urine, which varies in color according to the severity of the attack. The kidneys are always found congested, in an acute attack.

The tick which is the carrier of Texas fever is called *Boophilus bovis*. Its life history is simple and easily traced. It is essentially a parasite, attaching itself to the skin and drawing the blood of its host. It is unable to come to maturity and reproduce its kind unless it becomes attached to the skin of the bovine, whence it obtains its food. The eggs begin to develop at once, and when the embryo is fully developed it ruptures the shell. The time required for hatching depends a great deal on the temperature, and varies from thirteen to forty-five days. After hatching, these parasites soon attach themselves to cattle, showing preference for the tender skin of the escutcheon, inside of thighs and around the udder. When numerous, may be found on any part of the body. When about a week old they molt, and have four pairs of legs; within a week another molt takes place, and the tick passes into the sexual or adult stage. Impregnation now takes place and with the development of the ova in the body, the tick takes an increased quantity of blood, so that it becomes very much larger in a few days. When the female has reached maturity, it drops to the ground and begins laying eggs.

Southern cattle sent north during the spring and summer carry on their bodies large numbers of ticks. When these mature, they drop off and lay their eggs on northern pastures. These hatch and the young tick soon gets upon any northern cattle which happen to be on the pasture. As soon as they have attached themselves to the skin, they inoculate the cattle and Texas fever breaks out in a week or two. When the weather is cooler, this period may be longer. When native cattle are placed upon pastures which have been infected some time before with ticks, the disease will appear much sooner, because the young ticks may be already hatched out and attack the cattle at once. The fever appears before the ticks have matured. In fact, they are still small enough to be overlooked.

PREVENTION.

Keep southern cattle or manure from cars in which southern cattle have been hauled off the premises and keep susceptible cattle away from infected territory. The department of agriculture has been experimenting with dips of various kinds, and while they have nothing satisfactory as yet, paffarin oil is giving some good results. Dr. John Connaway, of Missouri Agricultural college, has been experimenting with a vaccine, or inoculation, and thinks he is on the road to success. The result of his experiments will be published in the near future.

PARASITIC BRONCHITIS.

Is a bronchitis caused by a parasite called "Strongalus Micrurus," which is found present in great numbers in outbreaks of this disease. The parasite is generally located in the bronchial tubes, but may be found in other parts of the body.

Cattle drinking stagnant water, or feeding upon very low pasture lands, are most frequently affected.

A cure may be effected by means of intra-trachial injections of turpentine, or other germicides.

During this biennial period, one outbreak occurred, in Clayton county, which caused the death of five animals.

THRUSH IN CATTLE.

This disease has been causing some loss to cattle owners in the southwestern portion of the State, and while the department has not been called to investigate, yet as a means of information I have secured the following short description of the disease from Dr. J. G. Parslow, assistant state veterinarian, who has seen a number of outbreaks in connection with his practice in the vicinity of Shenandoah:

During the late winter and early spring months Thrush in cattle has been the cause of considerable annoyance and loss to several stock men in Page and Fremont counties. In one herd of thin, aged cows, where the disease presented itself in rather an aggravated form, many died from thorough inability to move about and forage.

The cause of this trouble is no doubt due to an organism, formed by the decomposition of vegetable matter, commonly found on low lying, wet lands; such land is also suitable for the spread of the contagion. Once this irritating matter is lodged about the bulbs of the heels, or in the deep fissure of the foot, a tenderness and feverish condition of those parts is soon noticeable, followed by a profuse, obnoxious secretion. Then a gradual separation of the sensitive from the non-sensitive structures takes place, commencing at the bulbs of the heels, and progressing, if not interfered with, until the sole of the foot is entirely stripped of its covering. In this condition, cattle will lie around and starve to death, rather than suffer the agonies of standing to feed.

SECOND BIENNIAL REPORT OF THE INFECTIOUS ABORTION IN EWES.

During this period we have been called upon to investigate one outbreak of abortion in ewes, which was quite serious. There were over 800 ewes in the flock, and at the time of our visit about 130 had aborted. At that time the ewes that first became pregnant were beginning to have their lambs, apparently healthy and developed, but there were still a large number that were fully a month from lambing time. There was nothing in the condition of the premises, feed or water, that should cause the trouble, and besides, the ewes were in first-class condition. Young and old were affected alike. We could but conclude that it was infectious in its nature, and similar to infectious abortion in cows. We recommended the carbolic acid treatment, together with disinfection of the premises and isolation of all infected animals.

HOG CHOLERA.

During this period we have been officially called to deal with one outbreak of hog cholera, in Fayette county. Dr. Scott, assistant state veterinarian, in dealing with the outbreak, established quarantine on each infected farm, together with the use of disinfectants. The result was that some refused to obey all the conditions of the quarantine, and others found fault with them in their carelessness and wilful exposure of their neighbors, and the community became all broken up into factions. We make this statement, although uncomplimentary to the veterinary department and the community in question, to show how far the citizens of Iowa are from a satisfactory solution of the hog cholera question, when a large percentage of our citizens refuse to try the efficacy of quarantine restrictions, together with disinfection and serum treatment, which we, as well as all students of the disease, believe will control and stamp out hog cholera. The Iowa hog raiser seems to enjoy seeing his hogs die, so he can go to his neighbor's and tell his troubles and receive their sympathy, and next he enjoys seeing his neighbors' hogs die, so he may have the opportunity of returning to that good neighbor the sympathy he extended, with interest at the rate of several hundred per cent. If the time thus spent in carrying infection and wind from farm to farm was spent in

cleaning up the premises at home, scattering disinfectants and administering serum and disinfectants to the hogs, together with a study of proper mixed rations for hogs, the disease would soon lose its virulence, and it would not go broadcast over our fair state year after year. The farmers will organize to fight Indians or any class of intruders, but never think of organizing to fight hog cholera by seeing to it that our wholesome laws already enacted shall be lived up to in every particular, and that no stream shall be polluted with the carcasses of cholera hogs; no pasture or timber lands shall be strewn with bleaching carcasses, a prey for "the wild beasts of the field and birds of the air," but that all hogs suffering from or exposed to cholera shall be under proper control, and all carcasses of hogs dying from cholera shall be burned as provided by law. The laws already upon our statute books, carefully lived up to by every citizen, will go a long way toward weakening and controlling hog cholera. Then add to this lawful care of hogs, disinfection and serum treatment, and we believe the dreaded hog cholera will be so controlled as to save to the farmers and hog raisers of Iowa 90 per cent of the great loss heretofore caused by hog cholera.

MALIGNANT CATARRH OF THE OX.

During this period we received a call to Wright county to investigate a disease which Dr. Niles, assistant state veterinarian, pronounced malignant catarrh of the ox. This disease begins like catarrhal fever and goes on to ulceration with foetid breath. It affects different organs of the body, but is in fact a respiratory disease. There is sloughing of the respiratory mucus membranes, with extensive ulceration. The percentage of deaths from this disease is generally high, sometimes reach 90 per cent. It is considered infectious, although not of the most virulent type of infection.

MANGE.

During this biennial period we have been called to investigate two outbreaks of mange in horses, one in Decatur county and the other in Fremont county. In both instances treatment

was recommended and the affected animals placed in quarantine until recovery took place and no further danger existed. In this disease the disinfection of the premises is of as much importance as the treatment of the afflicted animals.

TUBERCULOSIS.

During this biennial period official visits and tuberculin tests have been made in the following counties, viz., Allamakee, Adair, Buena Vista, Carroll, Chickasaw, Crawford, Cass, Fayette, Henry, Ida, Linn, Pocahontas, Pottawattamie, Sac, Tama and Woodbury. In some herds no traces of tuberculosis were found, while in others the disease existed to quite an alarming extent. In three or four herds 80 per cent were found to be diseased. In some others 50 per cent, but in most herds the percentage diseased was below twenty. As a sample of the general average, we mention the results at Sioux City, where we tested 483 cows and condemned 91. In dealing with this subject we wish to convey to our readers, and more especially our legislators, the plain facts as regards this disease and its existence in the bovine herds of Iowa, but we do not for a moment entertain other than a friendly interest in the cattle industry of our great state; nor would we wish to say anything that would injure that industry, but rather speak in behalf of the permanent and healthy establishment of the same. To the man who still claims that tuberculosis does not generally exist in Iowa, and that mention of its existence does injustice to the cattle men of the state, we wish to say that tuberculosis does exist in every county in the state, and the deceptive plan of smothering the facts as heretofore will work greater injury to our cattle industry than to come out honestly and acknowledge the existence of this greatest menace to human life as well as to the lives of our bovine animals, and pledge our united efforts toward its eradication, to which end we invite the co-operation of the cattle owners throughout the state. The man who has 20 per cent of his herd tuberculous and allows the diseased animals to associate with the healthy ones in barn and on pastures will find in a short time that the percentage of diseased animals has doubled. Sometimes this occurs in a few months, and sometimes it will require a few years to so increase the percentage. On the contrary, if that

man will carefully test his herd, dispose of the diseased, cleanse, disinfect and keep the premises clean, he can surely eradicate the disease from his herd with the loss of the originally diseased percentage, without allowing that percentage to double up on him, as many men have done. The great obstacle we meet with in disposing of the diseased animals is the cry of the owners, "the state is robbing me of my property; the state should pay me full value for my cattle," etc. We reply emphatically that the state should not and cannot pay for any animal which is diseased and consequently has no value. Has any man a right to put a diseased animal upon the market and receive the price of a healthy animal for it? Since tuberculosis is preventable, the man who fosters it in his herd is accountable for his own loss. A man can be persuaded that it is his duty to destroy a glandered horse, because it is a menace to the horse industry, as well as dangerous to human life, his own life not excepted; and he will submit with very little fight for remuneration, but when you tell the same man he has a tuberculous cow, that tuberculosis causes a hundred times more losses of property than glanders, and sacrifices more human lives than any other disease known to man, he has the nerve to say "I don't believe it, and I won't allow that cow to be killed." You tell him that the milk from his tuberculous cow will transmit tuberculosis to hogs, cats, rabbits and guinea pigs, and he answers still "I don't believe it; I propose to sell her milk to my neighbor or give it to my children." All this being true, we think the state, in the interests of that man's health, and that of his family and neighbors, should emphatically say "your tuberculous cow is a menace to the public health, as well as the health of yourself and family, and is therefore pronounced a nuisance and condemned to death without right of appeal." We therefore stand opposed to the taxation of the people for the purpose of paying any and every man a price for his diseased animals. If the consumer of milk, meat and butter pays the price of good products he should receive them, and if the producer received that price for his products he should see to it that he offers for sale only pure, healthy products. The dairyman tries to justify himself in selling milk from suspicious or diseased cows on the ground that Jones or Smith sells milk to a neighbor from an untested family cow. All through there seems to be a tendency to justify wrong doing on the ground

that some one else does as bad or worse. Then the creamery man thinks he has found a remedy which exonerates his creamery butter, even though the milk from which the cream is separated is from a tuberculous cow, and contains the tubercle bacilli; in the centrifugal separator, which he claims through its wonderfully rapid revolutions separates all disease germs from the cream, and throws them off with the skimmed milk or sediment. This not only looks doubtful, but by experiments has been proven false, so the centrifugal separator man may as well come off his hobby, and help us eradicate tuberculosis from our herds, and by doing so place his creamery product above suspicion in the markets of the world.

The following article from the *Journal of Veterinary Science*, giving the results of inoculations from milk, sediment and cream from the centrifugal separator made by Kanthack & Sladen, Cambridge, England, throws much light upon the question of the transmission of tuberculosis in milk and even cream from the centrifugal separator:

Kanthack & Sladen (Lancet, London, England) have made a thorough examination of sixteen different milk supplies in Cambridge, England, and found that of these, nine were infected with the bacilli of tuberculosis. The tests were thorough in every case, the results of which show the necessity of inoculating more than one or two animals. The methods which they followed are described in detail:

Six guinea pigs were inoculated from each milk supply, and the results show that this number was by no means unnecessarily large, for in two instances out of the nine in which positive results were obtained, only one of the six animals inoculated became tuberculous. The facts elicited by these investigators are indeed striking and, we may almost add, appalling. More than half the supplies tested—nine out of sixteen—proved infective, while of the ninety guinea pigs inoculated in the course of the experiments no less than twenty-three (25.55 per cent) developed tuberculosis. It is possible that bovine tuberculosis is abnormally prevalent in the districts around Cambridge, though we have no statistics to support this opinion. It is probable, again, that the extremely searching character of the animal experiments is in part responsible for the high percentage of tuberculous milk found. But it is possible, and this is a point which, in our opinion, is of very great importance, that the employment for inoculation, not only of the centrifugalized sediment from the milk, but also of the cream, has had a definite bearing on the results.

There is an opinion prevalent in some quarters that the danger of conveyance of tuberculosis by cream is slight as compared with milk. These experiments point in exactly the opposite direction. Three times out of the nine cases in which a positive result was obtained did the cream produce tuberculosis, when the sediment failed to do so, and in no single

case was the sediment infective when the cream was not equally or more so. We are not aware that this point, clearly one of the first importance, has ever been distinctly brought out before. It is evidently impossible to disentangle tubercle bacilli from fat globules by mere centrifugalization.

The importance of the part played by milk in the dissemination of tuberculosis, especially in children, is well enough established. But it is researches like these which drive the facts home to the public conscience, and we heartily wish that more experimental work of this thorough type were forthcoming to emphasize and elucidate the dangers which attend the consumption of tuberculous milk.—*Modern Medicine and Bacteriological World*.

In connection with the subject of tuberculosis in Iowa I wish to call the attention of the legislators to the fact that in the absence of proper protective legislation our fair state is being made the dumping ground for cattle suspicioned or known to be tuberculous in all parts of the union. Will the legislature permit this to go on year after year? In the absence of proper protective laws in Illinois, Governor Tanner issued a proclamation recently prohibiting the importation of cattle for dairy or breeding purposes unless accompanied by certificate of test. A good measure for Illinois but dangerous for the people of Iowa, because car load after car load of Iowa cows are being tested preparatory to shipment to Illinois, and what is being done with the ones that react and cannot be shipped, of which there is liable to be about four in a car load? Are they to remain in Iowa and be sold again to Iowa dairymen? If so, the percentage of tuberculous cows in Iowa is bound to increase very materially. Without clear authority in law, the writer has very firmly required of the veterinarians whom he has recommended to the Illinois cattle commission as qualified to make satisfactory shipment tests, that they shall place all cows that react to the test in quarantine, in the name of the State, and shall not allow such cows to be secretly sold or bartered off to our farmers or dairymen. It will clearly be the duty of the legislature at the coming session to enact such laws as will make it the duty of any veterinarian or other person making a tuberculin test in Iowa to quarantine all animals that react, or report their findings to the local board, and it be the duty of such board to quarantine such diseased animals, and any veterinarian or other person, or local board, failing to comply with such law should be subject to fine or imprisonment at the discretion of the court.

For a thorough description of tuberculosis and its geographical distribution, we direct our readers to the paper on "Human and Bovine Tuberculosis," by Dr. G. A. Johnson in this report.

In conclusion, we most earnestly and honestly state that bovine tuberculosis exists throughout the state to a considerable extent, and if not carefully combatted will increase. That it will require larger appropriations to eradicate it from our herds and place our cattle and their products above suspicion in any state or nation. That all this can be accomplished by appropriating enough money to carry out the work without appropriating a dollar to pay the producer of diseased cattle. I ask the legislators and the people they represent: Shall we unite as one man in the interests of our cattle herds and their products, to eradicate this disease from Iowa herds, thereby placing our milk, butter, cheese and beef before the consumers of the world free from diseased germs, especially the tubercle bacilli?

DISINFECT DAIRY BARNs.

The following rules for disinfecting and cleansing barns should be adopted by all who desire to have healthy animals and their dairy products free from taint of any kind:

1. Clean out all litter, excrement, rejected fodder, cobwebs and dust, thoroughly sweeping down the walls and ceilings.
2. Spray ceiling, walls and floor with a solution of bi-chloride of mercury and water, 1 to 500.
3. Thoroughly whitewash all parts of barn with a whitewash containing one quarter of a pound of carbolic acid and a pound and a half of lime to a gallon of water.
4. See that the drainage from under the floors is sufficient to carry away all refuse matter. This is an important factor in keeping a healthy, clean barn.
5. See that all manure is carted away daily. We find in some instances great piles of heating manure against the outside walls and the offensive fumes therefrom permeating all parts of the barn.
6. See that the watering troughs are cleaned two or three times a week and only pure water given the dairy cow.

After milking each cow the milk should be carried to a scrupulously clean milk room and there strained and cooled. It should be stirred frequently until thoroughly cooled. A can of

milk may be placed in a refrigerator and allowed to cool without stirring, and it is certain to have a bad odor and taste, but with proper stirring while cooling this will be prevented.

Each dairyman is required to carry out the above rules for disinfection and cleansing of dairy barns and surroundings before a health certificate is issued.

THE RELATION OF BOVINE TO HUMAN TUBERCULOSIS.

The following excellent paper, by G. A. Johnson, D. V. M., Sioux City, Iowa, was read before the meeting of the Sioux Valley Medical association, at Storm Lake, in June, 1899. It deals very fully with the geographical distribution of bovine and human tuberculosis, and shows conclusively that human consumption does not exist where the family cow and her products are not used. We request all into whose hands this report falls to read Dr. Johnson's paper, which contains so much information on the subject of tuberculosis.

THE RELATION OF BOVINE TO HUMAN TUBERCULOSIS.

MR. PRESIDENT, LADIES AND GENTLEMEN—Perhaps you, my hearers, are not in accord with him who sang "Tell me the old, old story, tell it again," but I trust that you will bear with me for a short time while I give you a somewhat recent version of the old, old subject, tuberculosis.

I say the old, old subject, for history from the earliest times to the present day is replete with accounts of a disease that to-day we term tuberculosis.

Various terms have been used to designate the disease, and numerous theories have been advanced to explain its etiology and pathology. Often these theories confounded this with other and entirely dissimilar diseases, and until recently several of the localized manifestations of the disease were considered as separate and distinct diseases.

At one period the disease would be considered contagious, and at another, not so. These changes in the prevailing theories have been much more marked and frequent among physicians than veterinarians. Theory could not convince the veterinarian that the disease was not contagious, when he saw it spread, gradually, yet surely, from one animal to another, under favorable conditions.

But it was not until the latter half of the nineteenth century that the etiology and pathology of this "great white plague" were placed upon a sound basis, through the works of Villimian and Koch.

Notwithstanding the fact that much has been accomplished, since these discoveries were made, there remains many phases of the subject to be worked out. One of the most important of these problems yet to be solved

is the relation existing between human and bovine tuberculosis. And it is this phase of the subject that I wish to present for your consideration this evening.

Succinctly stated, the proposition is, that tubercular lesions, wherever found, are the direct results of the action of the tubercular bacillus; and further, that the domestic cow is the natural harbinger of this bacillus; or in other words, tuberculosis was primarily a disease of the bovine specie, and is found in man and other animals as a result of transmission, brought about through the ability of the tubercular bacillus to adapt itself to the various conditions, as found in the various animals.

I fully appreciate the fact that this position is not in accord with the prevailing thought of the medical profession; but it would be a waste of time and energy, yours and mine, for me to present thoughts fully in accord with yours.

Assuming that it is generally agreed that the disease is transmissible from one animal to another, and from various species to others, man included, I shall confine my efforts to a brief resume of some of the facts that indicate that tuberculosis is naturally a bovine disease.

PREMISES.

If we find that a certain disease is always prevalent where certain conditions prevail, the world over, and that it is never prevalent where these conditions do not exist, we have at least very strong presumptive evidence that these particular conditions must exercise a greater or less influence upon the distribution and spread of this disease.

This fact having been established, it at once places the disease in a new light, and suggests very important factors in relation to the control or eradication of the disease.

If this premise is tenable and susceptible of a logical deduction, and I believe that it is, such factors should always be considered in dealing with any disease, but more especially a contagious one.

In following out this thought, a brief examination of some of the various conditions in which we find tuberculosis most prevalent may present a new phase of the question.

CLIMATE.

While a dry, temperate climate may have more or less favorable influence upon the progress of the disease, we know that no set of climatic conditions, as to heat or cold, dryness or moisture, constantly prevails, for we find that the disease is prevalent in various sections from the torrid to the frigid zones.

Again, altitude, while it has in most places a marked influence on the progress of the disease, has but little influence upon the distribution of it, as is shown in the fact that certain peoples inhabiting the Dead sea basin, which is between 100 and 200 feet below the sea level, are free from tuberculosis; whereas, it is more or less prevalent among most people inhabiting the mountainous regions of Europe and America.

Civilization is not a constant factor in the distribution of this disease, for some of the savage and semi-civilized peoples are seriously afflicted with tuberculosis.

Other things being equal, we find the disease more prevalent the denser the population, but density of population is not a constant factor in the distribution of this disease, for we find that the masses of the people of China and India, two of the most densely populated countries of the world, are comparatively free from tuberculosis, whereas the disease is quite prevalent among the farmers of Europe and America.

Filth and poor sanitation have a marked influence in hastening the development of the morbid processes, but they are not constant factors and exert but little influence upon the distribution of the disease, for we find it all the way from the wigwam to the palace.

Thus we find that while the various conditions of climate, altitude, sanitation, etc., exert more or less influence upon the development of the morbid processes, they have but little influence upon the distribution of the disease.

Perhaps you are saying that tuberculosis is so widespread and is prevalent under such diverse conditions that there are not and cannot be any constantly associated factors in its distribution.

Nevertheless, a careful study of the geographical distribution of tuberculosis reveals the fact that all peoples who use the milk and flesh of the domestic cow (the in and in-bred cow) as food products, are more or less afflicted with tuberculosis. And further, that there is usually a very uniform ratio between the quantities of such foods consumed and the prevalence of the disease among the people.

On the other hand, all of those people who do not use the food products of the domestic cow are comparatively free from the disease.

The exceptions to the above are those communities where there are a greater or less number of transient tubercular patients, or where a greater or less percentage of the inhabitants are tuberculous subjects, who have migrated to these special localities that they might receive such advantages as climatic conditions and altitude might afford.

A short resume of the geographical distribution of the disease will, I think, justify this statement of facts:

Prof. E. F. Brush, M. D., of Mount Vernon, N. Y., in a paper read before the New York Academy of Medicine, April 18, 1889, makes the following statement: "This insidious and delusive disease is not the result of civilization, as is generally supposed. Barbarous and semi-civilized races are afflicted as severely as many of the most advanced civilized races.

"Neither geographical position nor climatic conditions are a factor in the distribution of pulmonary phthisis. Every known part of the globe, with a few isolated areas excluded, is a habitat of the disease. After several years of close study of the affection, and consulting all accessible statistics and the habits of the people where the disease prevails, the only constantly associated factor is found, in my opinion, in the inbred bovine specie, without any regards to the social position of a community or its geographical habitation, terrestrial or atmospheric condition. If a community is closely associated with inbred cattle, tuberculosis is prevalent."

In the fifteenth annual report of the state board of health of New York, for the year 1895, on page 720 may be found the following: "Human tuberculosis is co-extensive with bovine tuberculosis. Broad generalization of our knowledge shows a close parallelism between the numbers of dairy cows

and the prevalence of tuberculosis in the human race. Countries that have few or no cattle, or in which the herds are mainly kept in the open air, and are therefore largely protected from the disease, show as a rule little tuberculosis in man."

EUROPE.

In the European countries cattle have existed and tuberculosis has prevailed in man, to a greater or less extent, for centuries. Some special localities will be mentioned later.

In some of the more recently civilized countries, we find that tuberculosis was very rare or unknown before the introduction of the domestic cow.

AUSTRALIA.

During the early settlement of Australia by the English, tuberculosis was so rarely seen as to give strength to the idea that the climatic conditions of the country were incompatible with the disease. But with the advent of cattle raising, which began to be carried on extensively in 1821, consumption began to appear among the people and it has gradually increased, as has cattle raising, until the disease has become nearly as prevalent there, notwithstanding the delightful climate, as it is in the mother country, England.

NEW ZEALAND.

A similar condition prevails in New Zealand; previous to the colonization of this country by the English, phthisis was unknown among the Maories. But with the advent of the Englishman's cow, tuberculosis became a veritable scourge to this simple people, that threatens the extinction of the race if measures are not taken to control its spread. As Hirsch has so well put it: "In my opinion, the death rate from phthisis will keep on increasing in that locality if the breeding of cattle is not properly regulated by law." This statement of Hirsch means that tuberculosis must be controlled in cattle, or the Maories must go.

SOUTH AFRICA.

In South Africa we find a different condition. The early explorations of the white man revealed the fact that the principal vocation of the coast tribes was cattle raising. And, owing to the peculiar customs of these tribes, their cattle were very closely inbred. It was also noticed that tuberculosis, of a very malignant type, prevails among these tribes. Whereas the tribes of most of the interior parts of Africa, who have no domestic animals because of the Tsetse fly, are free from tuberculosis.

MADAGASCAR.

The native tribes of this island have comparatively large herds of cattle, the flesh and milk of which form their principal source of food. And, according to Grenet, this semi-civilized people are severely afflicted with tuberculosis.

NORTH AMERICAN INDIANS.

Previous to the time that Uncle Sam placed the Indians under his fatherly care, they were free from tuberculosis; but since they have so far advanced in civilization as to eat beef furnished to them by this govern-

ment, tuberculosis has become very prevalent. According to some of the physicians who have been stationed at some of the Indian reservations, tuberculosis causes as high as 50 per cent of the mortality of some tribes. The custom of dividing a carcass of beef among a large number of Indians, and the fact that they eat any and all parts uncooked, either fresh or dried, will probably account for the prevalence of the disease, as a single carcass would, under these circumstances, serve to infect a large number of Indians. Some have attempted to account for this unusual per cent of infection by the filthy habits and unsanitary abodes of the Indians. But I am of the opinion that there are no reasons to believe that the Indians are filthier to-day than they have always been. Nor are the Indian wigwams any filthier or as close and unsanitary, as are the igloos of their northern brothers, the Esquimaux; yet these latter people, in their natural haunts, are free from tuberculosis. The Esquimaux has his dogs and reindeer, but no tuberculosis; while the Indian has his dogs and beef, and is seriously afflicted with tuberculosis. On the other hand, it has been found that the Indian is no more susceptible to the disease than is the Esquimaux. For when the Esquimaux is brought in contact with the white man and his cow, he readily contracts the disease, as is shown by the prevalence of tuberculosis among these people who live in the Danish settlements of Greenland.

ST. MICHAELS ISLAND.

In St. Michaels Island we have a somewhat different condition. Large numbers of cattle and sheep are kept on the island, but they belong to the landlords, who export most of the meats and milk products. The peasants who take care of the stock and market the products toward payment of rent for the land, principally use the ass as a beast of burden and a milk producer for his own family, because this animal can be kept more economically. Notwithstanding the fact that the climate is not favorable for tuberculous people, the disease is very rarely seen among the peasants.

ICELAND.

A very similar condition exists in Iceland, yet the Icelanders are quite susceptible to the disease when they immigrate to Denmark, where meat and milk are staple articles of food.

SWITZERLAND.

In some of the cantons of Switzerland there are few cattle, goats being largely used instead, and tuberculosis is not common in man, while in other cantons there are more cattle, and tuberculosis is more prevalent among the people.

ITALY.

In Italy, a country blessed with one of the balmiest climates of the globe, tuberculosis is very prevalent.

STEPPES OF RUSSIA.

The Cossacks who inhabit the steppes of Russia are free from tuberculosis. These people use the flesh and milk of the horse for food. They have large numbers of horses, but no cattle.

GREAT KABYLIA.

Tuberculosis is unknown among the semi-civilized tribes of Great Kabylia. These people have large flocks of sheep and goats, but no cattle.

SOUTH AMERICA.

Similar conditions are found in a majority of the South American countries. That is, they do not use much beef or milk, and they are comparatively free from tuberculosis.

THE UNITED STATES.

But let us come a little nearer home. A few years ago when the red man followed the bison and the deer trails over our western prairies unmolested by the hand of civilization, Minnesota and Iowa were thought to be nature's sanitarium for consumption. But to-day we find the white man in possession, and cattle raising one of the principal industries of this, comparatively, thinly settled country. And tuberculosis is quite prevalent among the people; while it is estimated that $1\frac{1}{2}$ to 3 per cent of the cattle (and we know that as high as 75 per cent of some herds) are tubercular. Thus we find that as the country settles up, and cattle raising takes the place of the chase, nature's sanitarium moves to the west.

CHINA.

In China we find a peculiar condition relative to tuberculosis. The wealthier, or ruling classes, who live in the best homes and are surrounded with the best sanitary conditions of the country, having plenty to subsist upon, and using more or less of the food products of the cow, are frequently afflicted with tuberculosis, while the poorer classes, who can scarcely eke out an existence, and live in crowded quarters and under conditions that are anything but good from a sanitary standpoint, subsisting almost wholly upon a vegetable diet, probably never tasting meat other than rat soup, are free from tuberculosis.

INDIA.

A somewhat similar condition prevails in India. Owing to religious beliefs these people are largely vegetarians.

Other and similar instances could be cited, but I trust that sufficient has been presented to substantiate the statement that among every people who use the food products of the domestic cow, tuberculosis is more or less prevalent; while it is rarely, if ever, seen among those peoples who do not use such foods.

COMPARISON OF THE DISEASE.

In the main, the morbid lesions are very similar, if not identical, in man and cattle. Yet a brief comparison of the disease as seen in the two species reveals, among others, these apparent differences, which may in reality be differences of degree rather than of kind.

First.—The disease runs a more insidious course in cattle than in man.

Second.—The formation and escape of tubercular pus is much more limited in cattle than in man. This is probably due to the marked tendency in cattle toward a limitation of the morbid process by the formation of a dense, firm, fibrous, limiting membrane, surrounding such morbid processes.

Third.—The ulcerative condition so frequently met with in man is not so common in cattle.

Fourth.—Septicaemic conditions that so constantly accompany pulmonary tuberculosis in man are rarely seen in cattle, except in the very last stages of the disease.

Fifth.—The anaemia, rapid loss of flesh and strength, so constant in tuberculosis of man, are not seen in cattle, except in the latter stages of extensive morbid lesions.

Sixth.—Tuberculin has very little, if any, deleterious effect on cattle, whereas it is supposed to have a marked influence on the germ, arousing an activity in latent conditions of the disease in man.

Seventh.—Differences, though slight as they may at first appear, indicate that the cow is the natural harbinger of this germ; or at least that nature has endowed cattle with much stronger powers of resisting the invasion of the tubercular bacillus.

If the disease is wholly or even largely distributed by tubercular people, why is it that in China the disease is quite prevalent among the wealthier classes, who are surrounded with the better conditions of life, while it is very rarely found among the poorer classes, who live, to use the expressive slang phrase, "any old way?" Why is the disease not transmitted from the wealthier to the poorer classes? Would it not be reasonable to expect that after it had once gained access to the haunts of these poorly clothed, illy housed, and precariously fed people of the poorer class, that it would spread among them with more rapidity than it would among those whose surroundings are better in every way, and less favorable to the development of the disease, except that the wealthier classes use the food products of the cow?

□ If the disease had been but recently introduced into this country by a few persons having contracted it in some foreign country, it would be easy to arrive at satisfactory conclusions, but such is not the case, for the conditions, as relates to the disease and the two classes, have not materially changed for many years.

The only logical deduction that I have, as yet, been able to derive from these facts, is that the cow, in this case at least, is the principal factor in the spread of the disease. And what is true of this case should be equally true in others. Perhaps others may be able to offer a more satisfactory explanation.

Again, if the human tubercular patient is such an important factor in the transmission of the disease, why do not the permanent inhabitants of resorts for consumptives more readily contract the disease? Or why do not the tribes of Central Africa become infected from the coast tribes?

Would it not be reasonable to expect this process to go on until the disease would be as prevalent among the interior as the coast tribes?

It would appear from these facts that there is very little tendency for the disease to spread among those peoples who do not use the food products of the cow.

One of the most common, and perhaps the most fallacious argument that is brought forward in support of the theory of human transmission, is the theory that the seat of primary infection, or more properly speaking, the seat of the most frequent extensive morbid lesions, is an indication of the

method of infection; or, in other words, that the seat of the morbid lesions points out the avenue through which the germs gained an entrance to the animal economy.

If we reason by analogy, it is at once apparent that the theory is misleading. Take for illustration, smallpox, measles, mumps, Asiatic cholera, bubonic plague, yellow fever, etc. These are bacterial diseases that are transmitted, or rather contracted, by inhalation. Yet in none of them are the morbid lesions confined to the air passages or the lungs; in fact, these organs are not affected, except as a complication of the disease proper.

Again, anthrax and blackleg of cattle, and glanders of the solipeds, are usually contracted through the ingestion of contaminated foods or water; but the morbid lesions are not confined to the digestive tract; in fact, it is the exception to find seats of the infection in these organs, especially in the latter disease.

The question naturally arises, why should this theory apply to the tubercular bacillus so much more forcibly than to other organisms of a similar nature? Nor do laboratory experiments substantiate this theory as fully as we might reasonably expect.

It should be borne in mind that in artificial inoculation the bacilli are usually introduced into the animal economy in very much larger numbers at a time than in natural infection.

Is it beyond the limits of sound reasoning to suppose that if a large number of these germs are introduced at a given point that they will act as a foreign body that will produce more or less irritation, thereby forming a favorable nidus for the development of the germs and obstruct their entering the circulation? Whereas, in natural infection the germs are usually so few in number as to produce little or no irritation to a free surface; consequently, they would be much more likely to gain an entrance to the circulatory system. Therefore, we should expect a much greater per cent of development of morbid lesions at the point of entrance in artificial than in natural inoculation.

My experience in post mortem inspection leads me to believe that in cattle primary lesions of the lungs are comparatively rare. A careful necropsy will usually demonstrate that the primary focus or foci are in some of the lymph glands, and with these serving as extensive culture fields, from which the germs are carried to other parts of the animal economy by continuity of the parts and by the circulatory systems. This process of auto-infection, with probable reinfections from external sources, sooner or later results in extensive or generalized morbid lesions.

In swine the lymph glands, spleen and the osseous tissue seem to be the most frequent seats of primary foci.

It is evident from the above that the germ first enters one of the circulatory systems before finding a field suitable for its development.

If this be equally true in the human, as some post reports seem to indicate, it is very evident that the theory in question is erroneous.

In connection with this phase of the subject, I will cite the history of a case as given to me recently by a prominent physician who was called to treat what he had reason to believe was a case of chronic, or more properly speaking, simple tonsillitis in a woman. Ordinary treatment for this affec-

tion was prescribed, and the throat lesions rapidly subsided without rupture on the free surface; but the patient developed constitutional disturbances which proved to be tubercular meningitis that ran a remarkably rapid course, death taking place on the forty-first day from date of calling the physician to attend the throat trouble. This woman was of a tuberculous family, a brother having recently died of that disease.

Judging from the conditions I have seen in cattle, as above described, I am inclined to believe that this throat trouble was tubercular, and that instead of the tubercular products escaping by an opening on a free surface, as in previous attacks, it was absorbed, with the results as above stated.

Again, will the advocates of this theory please explain how it is that we have primary infection in the form of tubercular ostitis, arthritis and meningitis? If the germs do not enter the circulatory system, how do they reach these deep seated tissues? And if the germs do enter the circulatory system in these instances, are they not just as likely to enter it in other instances? And if they do enter the blood channel at all, are they not as liable to be carried to the lungs as from them?

One more thought relative to the spread of this disease by inhalation. It has been demonstrated beyond question, by a number of the leading bacteriologists of the day, that sunlight and atmospheric exposures will destroy most of the pathogenic micro-organisms. This seems to be especially true of the tubercular bacillus, yet how often it is that physicians and others will write and talk about the dangers of contracting tuberculosis by inhaling the tubercular germs that are constantly floating in the air in connection with dust, etc. While there is no question but what the tubercular bacillus may often be found in quite large numbers in the dust of buildings and especially rooms that have been, or are, occupied by phthisis patients, it is equally true that outdoor air is rarely contaminated with these germs.

If the air is so impregnated with these germs as some would lead us to believe, would it not be reasonable to expect that we would have more or less wound inoculations in the bovine species, for wounds in cattle are very rarely kept antiseptic. And if we should get inoculations from this source, and the theory is true that the tubercular bacillus always leaves his path of entrance to the animal economy strewn with morbid lesions, we would certainly have more or less cases of local manifestation of the disease in cattle, the same as is sometimes seen in the human, and fully 90 per cent of all adult cattle would thus become inoculated at some time. Yet so far as I know, there is not a single case of this kind on record.

No, gentlemen, when we talk about the constant spread of this disease through the inhalation of the germs in the outside air, we are simply clinging to the relics of an old, pernicious, bygone theory.

Several theories have been advanced to explain how immobile bacilli gain an entrance to the animal economy, but my time will not permit me to discuss this phase of the question, further than to say that while none of them have as yet been fully substantiated, some recent experiments seem to indicate that germs adhering to oil globules, as in meat and milk, may be readily taken up by the lacteals. When this point shall have been settled, it will undoubtedly clear up some mooted questions of to-day.

I am of the opinion that the tubercular bacillus usually enters either the blood or lymph systems as does other germs, and is carried along until it reaches a field that presents favorable conditions for its development, provided it is not destroyed by natural forces before reaching such fields. The lymph glands, especially those of the splanchnic cavities, most frequently present favorable fields for the primary development, though this may differ somewhat with age, specie and the physical condition, not only of the animal economy, but with the various organs, as injuries of the osseous tissue, especially in the young emboli and stenosis of the small blood vessels, etc. The air vessels of the lungs, especially in man, may at times present favorable conditions, but these are exceptions, rather than the rule.

While it is quite generally agreed by the medical profession that there is more or less danger in the use of the food products of tuberculous animals, this phase of the question has never received the attention that its importance justly demands. There has been but little concerted action upon the part of the medical profession to prevent the spread of the disease through the use of the food products of tubercular animals.

It appears as though a large per cent of the busy practitioners have, perhaps unintentionally, arrived at the conclusion that to control tuberculosis is beyond the power of man, and give the subject very little consideration, other than to prescribe such lines of treatment as promise the best results, entirely ignoring the fact that their patient is, perhaps, being daily reinfected through the use of contaminated foods.

It is evident from the almost unlimited lines of treatment that have been advocated, that curative treatment has received much more attention than has been given to prophylactic treatment.

Perhaps you are asking, what can be done to lessen the spread of the disease? In reply I would say that if the logical deductions of this paper were followed, all that would be necessary would be to stamp out the disease in the bovine specie. But to assist in the good work, to hasten its accomplishment, and to obviate all danger of a possible error in the views presented, I would suggest the adoption of such sanitary precautions as may be justly enforced relative to tuberculous people and animals; for every tubercular animal is, to a greater or less degree, a disseminator of the tubercular bacillus, and I would especially urge the prohibition of the traffic in and sale of the food products of tuberculous animals, as may be accomplished by proper milk and meat inspection, as indicated in the following:

By the proper use of the tuberculin test and proper sanitary measures, the dairy can be freed and kept free from tuberculosis, and inspection properly carried out will prevent the sale of the flesh of diseased animals. But in order to accomplish this we must have laws enacted that will provide for such inspection and furnish the money with which to carry on the work; and before this can be accomplished, the general public must be educated, to have a just appreciation of the dangers that constantly attend the use of all foods that may be contaminated with tubercular bacilli.

THE POSITION OF THE PHYSICIAN.

As physicians, you have it in your power to wield an immense influence for good in this field. Good results would soon be manifest if each physician

would recommend to his patrons the use of, and use in his own family only such animal food products as have been properly inspected.

Each and every physician has more or less political influence which he should not fail to exert in behalf of wholesome legislation along these lines. This is a just proposition, because the question of stamping out tuberculosis, that is, the enactment of laws and the appropriation of money to carry on the work, savors largely of politics.

If the medical profession of the state would make a united effort in behalf of the suppression of tuberculosis in the dairy cattle of the state, it would not be long ere we would have good laws and plenty of money with which to carry on the work.

In conclusion, let me urge you to arouse from your lethargic state relative to this disease. Let all of us take an active part in stamping out this, the greatest of all animal scourges, that we may feel that we have in this instance at least, fulfilled our duty towards mankind.

BIBLIOGRAPHY—(1) Paper by Prof. E. F. Brush, M. D., of Mt. Vernon, N. Y., before the New York Academy of Medicine, April 18, 1899, The Relationship existing between Human and Bovine Tuberculosis. (Veterinary Review, Vol. 14, No. 11.)

(2) State Board of Health of New York, Fifteenth Annual Report, 1895.

(In compiling this paper, I have freely consulted all authorities at hand, and especially the two above cited.)

A PECULIAR DISEASE.

In the spring of 1899 we were called to investigate an outbreak of disease at Mt. Pleasant, which was a little difficult to diagnose. The symptoms were such as to create suspicions of tuberculosis, which induced us to apply the tuberculin test, which gave us only two reactions in the herd of forty-seven cows. A post mortem was made on one cow that reacted. Some tubercular lesions were found. There was revealed, however, a disease of the intestines, which caused irritation, abnormal secretion of mucous and some diarrhoea. In the coats of the intestines were found numerous nodules, a number of which were taken for examination under the microscope, together with mucous contents of the bowels. The result of such examination is given here in the following letters from Dr. O. A. Geeseka, of Mt. Pleasant, who was very much interested in the case and brought his microscope and expert knowledge into play, which assistance we appreciated very much:

MT. PLEASANT, Iowa, May 22, 1899.

J. I. Gibson, State Veterinary Surgeon, Denison, Iowa:

DEAR DOCTOR—Your letter relative to the Carron's herd received. You will remember that while Dr. Griffith was making the post mortem he found among the many nodules on the intestines an unusually large one,

and in trying to remove it ruptured the same, and that the contents thereof appeared to be a yellowish-green pus. On microscopical examination, it proved to be pus, and also to contain a bacilli which had the appearance under a 1-12 oil immersion lens of the typhoid bacilli in the human. They had all appearance of being motile, but I did not succeed in staining the flagella if they possessed them.

I cultivated some on Loeffler's blood serum, also on glucose agar. They made a very profuse growth. Although I said above that these bacilli resembled the typhoid bacilli, they also resemble the bacillus *Coli communis*, and for want of time I have not made a differential examination.

Yours truly,

O. A. GEESEKA, M. D.

MT. PLEASANT, Iowa, June 7, 1899.

J. I. Gibson, State Veterinary Surgeon, Denison, Iowa:

DEAR DOCTOR—I have re-examined the bacilli from the Carron's cattle and find them to be motile and in all respects like the typhoid fever bacilli in the human family, save and except that they are somewhat larger, which may be due to a difference in the location of their growth. It is a well established fact that difference in culture, media and environment will cause a difference in the growth of some kinds of bacilli.

So that we are fairly safe in saying that it is the bacilli typhi that were found in the Carron's herd, and are the cause of the disease there existing.

Yours truly,

O. A. GEESEKA, M. D.

A CAMPAIGN OF EDUCATION.

We all need a higher education in sanitation, which will enable us to bring about legislation which will better preserve the public health, as well as teach us that a higher life in personal sanitation is necessary in order that disease by contamination or infection may be known no more.

The following paper by Senator J. M. Emmert, M. D., of Atlantic, was read before the Iowa State Veterinary association, and will impart to its readers an education which will prove useful and beneficial in everyday life. I especially call the attention of the reader to the high scientific position in which the veterinarian is placed by the author of this valuable paper:

A CAMPAIGN OF EDUCATION.

We have heard much the last few years of campaigns of education.

The great political battle of 1896 was called a campaign of education, because almost every man, woman and child in this great country was studying the money question and the most learned men on both sides of the

question were employed to prepare circulars, leaflets newspaper and magazine articles, which were scattered abroad by the millions.

The question of slavery was settled by force of arms, but only after the people had been aroused by the teachings of Wendell Phillips, Lloyd Garrison and Horace Greeley.

But, notwithstanding the newspaper campaigns of these men, and the eloquent addresses in the halls of congress, the nice, quiet, pathetic, earnest and truthful appeal made by Harriet Beecher Stowe, through "Uncle Tom's Cabin," was the small still voice that aroused the people to action, and slavery went down before its mighty influence.

Thus it is that in all reforms it is the quiet but persistent work by those who are devoted to the cause that will win in the end.

I have selected this subject for your consideration, to-night, because I regard you as a band of educated and scientific men who are engaged in the great warfare against filth and disease, and preach the gospel of cleanliness and happiness; and I want to welcome you as co-workers in this field with the profession to which I have the honor to belong.

The day of the "horse doctor" is past and gone, and the educated veterinarian has taken his place, full of enthusiasm, zeal and a desire to understand the underlying causes of disease, and, if possible, to remove them.

He is satisfied with nothing but a scientific explanation of all questions pertaining to the profession. I am rejoiced to find so many of the profession not only interested in sanitary questions, but practical sanitarians.

As the people become educated to your worth, not only as veterinarians but as sanitarians, your sphere of usefulness will extend.

You are presumed to understand the diseases of animals, both alive and dead, and able to point out and explain the difference between diseased and healthy food products, especially meat and milk. This being the case, no man in the community can be of as much benefit upon the local board of health as the learned veterinarian, and, I think, the time is not far distant, or at least I hope so, when every slaughter house, meat market, dairy, or other place where food products are bought and sold, will be inspected, and under the supervision of the local board of health. When that time does come, gentlemen, you will be called upon for your services, and the people will demand that they have the benefit of your knowledge. In fact, it is your duty, as well as mine, to assist in bringing about this happy result. You understand the dangers of eating meat infected by trichina and actinomycosis, or drinking milk infected by tubercular bacilli; along with the medical profession, and with sanitarians, it is your privilege, as well as well as duty, to be teachers, leaders, and educators in this great work. The field is not only great, but the work is grand.

No man can fill the niche in the world that God intended he should fill, and live for himself alone. What we do to elevate and make humanity better, place our fellow-man upon a higher plane of usefulness, make him happier, wiser and more prosperous, will alone secure the greatest happiness for ourselves and make us feel that we have not lived in vain.

You will be confronted by many difficulties; and will have all kinds of obstructions to overcome in your fight against ignorance, prejudice, sordid and avaricious desire to accumulate wealth. All these obstacles must be removed or overcome before the people will understand and appreciate the

fact that they have an abiding interest in the fight against filth and disease.

Your fight is in the interest of humanity; not of life alone, but the protection and preservation of property as well. I will not attempt to go into statistics to any extent to prove any assertion I may make, but suffice it to say that one-half of the deaths are caused by contagious diseases, all of which are preventable diseases and should be eradicated, and would be if proper sanitary laws were upon our statute books and heroically enforced.

The existence and spread of typhoid fever, scarlet fever, diphtheria, tuberculosis, hog cholera, trichina and actinomycosis are *prima facie* evidence of either our ignorance or criminal negligence, and an insult to our higher civilization.

The loss of life and destruction of property by these preventable diseases are beyond our conception unless studied in the light of modern, scientific statistics. Take as an illustration tuberculosis, or the great "white plague," as it is sometimes called. One out of every seven deaths throughout the world is caused by tuberculosis. Iowa contributes nine deaths every day; 3,000 every year. The United States contributes 150,000 and the world 5,000,000 per year.

Contemplate these figures for a moment, then ask yourself why the people are not aroused to the dangers that surround them, and demand that our law-makers, both state and national, shall enact laws to stamp out this disease, or at least prevent its fearful ravages. If a case of smallpox is reported in this or adjoining states, the state board of health at once makes preparations to prevent its spread. Newspapers take up the cry of danger, and the people become excited and demand that the local boards of health be doubly vigilant.

Last winter the house of representatives of this state sent Dr. Kennedy to the northern part of this state to investigate a case of leprosy, and see what was necessary to protect the state from its ravages. What a farce! This is literally straining at a gnat and swallowing a camel. More people die of tuberculosis in one month than have died of smallpox in the last ten years. The almost complete stamping out of smallpox is a beautiful example and a scientific demonstration of what can be done by preventive medicine; and, if to-day the laws throughout the united world compelling the vaccination of every child at a certain age were enforced, smallpox would, in ten years, be a lost disease.

Now, in my judgment, tuberculosis is just as easily stamped out as smallpox. It may take generations to do it, but with proper legislation and its complete enforcement throughout the world--I mean a concerted action of all the powers of the world--will reduce the mortality due to the disease to a minimum, if not entirely wipe it out.

But to do this we must start right; we must understand thoroughly the etiology of the disease, its natural history, how it spreads, etc.

Every case of tuberculosis comes from some other case of tuberculosis in either man or beast.

There is no such thing as spontaneous generation of tuberculosis. The germs causing the disease do not arise in that way. Every germ must come from a pre-existing germ and be grown in a suitable medium to produce the disease in man or beast.

Now this man or beast may be a suitable medium for the disease, but if they never get any germs into their system, they will never have tuberculosis. Then what must we do to prevent their taking the disease? Why, of course, keep them away from the disease, and in this way keep the disease away from them. A large per cent of the cases are caused by the inhalation of germs floating in the air, and which were thrown off by expectoration by human beings, discharges from the nostrils of animals, or from the bowels of both. These discharges are dried and float in the air, and are drawn into the lungs; or, as in animals, they are rubbed on troughs, posts or other material, to be licked up by the animal.

But this is not the only way the disease can be contracted. Tuberculous meat and milk are responsible for a certain per cent of these cases.

Meat, if properly cooked, may be eaten with impunity, but we do not yet understand what is properly cooked tuberculous meat. A certain temperature may kill the bacilli, but not the spores; so the safest way is not to eat it at all. In my judgment, a large majority of bottle-fed children that die and are reported as marasmus, cholera infantum and other wasting diseases, are nothing more than intestinal or meningeal tuberculosis, caused by tuberculous milk.

But there is another and very important side to this question, and one which our agricultural friends are especially interested in.

The loss of cattle by this disease alone runs into the millions of dollars. The property value of stock, thus diseased, is hard to estimate, as no statistics to my knowledge have ever been gathered. I know one stock raiser in my part of the state who had destroyed by our efficient state veterinarian, for tuberculosis, \$5,000 worth of high bred cattle. This gentleman had a practical but very costly lesson, but he intends to profit by it, as he wrote me, in answer to an inquiry, that in the future every animal leaving his yard for breeding purposes will carry with it a certificate showing that it had been tested by tuberculin and was free from tuberculosis. He also said that every animal coming on his place will have to have the same kind of certificate. I do not want to see every farmer in Iowa take the same lesson, but I do hope they will profit by this gentleman's experience.

There is still another side to this question that touches every farm and dairy man. Iowa is fast becoming the greatest dairy state in the union. I find in the tenth annual report of the state dairy commission, that there were shipped out of the state 80,032,916 pounds of butter, an increase in one year of 13,535,808 pounds, and 626,632 pounds of cheese. This only represents a certain per cent of the product manufactured, neither does it include the raw milk used as food, and buttermilk, skimmed milk, etc. But you have some idea of the immensity of the dairy interest from these figures. Now we must have for this product an increasing and steady market; one that is efficient. The secretary of agriculture recognizes this fact, and at once, upon taking office, proceeded to introduce American butter into the Liverpool and other English markets. These markets have been mainly supplied by the dairy interests of northern Europe, where tuberculosis exists, as well as here. I believe it is an acknowledged fact that butter made from tuberculous milk will contain the bacilli. This being the case, as long as we export butter containing these germs we cannot expect to excel in the markets of the world.

But stamp out the tuberculosis in Iowa, and then stamp upon every case of butter that goes out of the state "guaranteed free from pathogenic germs." Make the word "Iowa" upon every case stand for "purity" and the demand will soon be so great that the dairy interests of the state will be doubled, and Iowa will at once step to the front as the greatest dairy section in the world. What I have said about tuberculosis from a money standpoint can be applied to hog cholera. Hog cholera is a contagious disease, and consequently can be prevented and finally stamped out, if the proper remedy is applied. You at once ask me for the remedy. This every sanitary and scientific student understands. It can be summed up in one word, "segregation." Every animal, when once infected, should be destroyed. When I say destroyed, I don't mean killed and used as a human or animal food, allowed to lie and rot, or even buried, but *burned*, cremated, disinfected by fire. The township trustees and city and corporation councils as boards of health, led by an intelligent veterinarian, should have charge of all suspicious animals, and not only order their destruction and final cremation, but do it themselves or have an officer delegated for this work.

It is not sufficient to destroy our diseased stock. We must have some means by which we can keep diseased stock out of the state. You can not destroy a stream by damming it up—destroy the source and the stream will dry up—so it is with tuberculosis and other contagious diseases among stock. Destroy the disease at home, and keep outside diseased stock from coming in, and our herds will soon be free from contagious disease. The cattle and hog men tell me this kind of legislation would ruin their business. You will find this argument is used alone by the middle men, the men who buy and ship, and care but little whether the stock handled is healthy or diseased.

But take the farmers and stock raisers who take pride in their business and who are interested in the growth and development of our beautiful state, and I think you will find them, almost to a man, interested in this subject and willing and anxious to do everything possible to stamp out contagious disease, and thereby give protection to the people and property of the state.

Now, gentlemen, the people must be educated along these lines, and when they once understand that quarantine means protection to life and property, they will not only demand that none but healthy animals enter the state, but that all diseased animals in the state shall be destroyed.

Should this be accomplished a wonderful impetus will be given our stock, meat and dairy interest, and Iowa with one bound will leap to the front as the greatest stock and dairy country in the world.

FINANCIAL EXHIBIT.

NAME.	No. of days service.	Per diem.	Expenses.	Total.
G. A. Johnson.....	24	\$ 120.00	\$ 55.09	\$ 175.09
S. H. Kurgery.....	10	50.00	80.28	80.28
J. W. Griffith.....	46	230.00	151.84	381.84
E. E. Sayers.....	9	45.00	22.56	67.56
P. O. Koto.....	6	30.00	20.68	50.68
J. D. Inger.....	5	25.00	10.00	35.00
C. E. Stewart.....	6	30.00	19.19	49.19
S. H. Johnson.....	74	370.00	269.64	639.64
J. W. Scott....	18	90.00	59.10	149.10
Jno. E. Brown.....	53	265.00	183.67	448.67
J. H. McCleod.....	12	60.00	35.01	95.01
R. B. Hammond	89	445.00	345.32	790.32
J. I. Gibson.....	569	2,845.00	1,914.30	4,759.30
Total....	921	\$4,605.00	\$3,116.68	\$7,721.68

RULES AND REGULATIONS.

OFFICE OF THE IOWA STATE BOARD OF HEALTH, {
DES MOINES, January, 19, 1898. }

Pursuant to authority vested by chapter 14, title 12, of the code, section 2530, the state veterinary surgeon by and with the approval of the state board of health, and the executive council, does hereby make and establish the following rules and regulations for the prevention and restriction of contagious diseases among domestic animals:

RULE 1. All cattle brought within this state from any county or parish within the United States where pleuro-pneumonia is known to exist, shall be subject to quarantine for a period of not less than sixty days.

RULE 2. No person owning or having the care or custody of any animal affected with glanders or farcy, or which there is reason to believe is affected with said disease, shall lead, drive, or permit such animal to go on or over any public grounds, unenclosed lands, street, road, public highway, lane or alley; or permit it to drink at any public water trough, pail or spring, nor keep such diseased animal in any enclosure in or from which such diseased animal may come in contact with or close proximity to, any animal not affected with such disease.

RULE 3. Whenever notice is given to the trustees of a township or to a local board of health, of animals suspected of being affected with glanders or farcy, said trustees shall immediately require such suspected animals to be isolated and kept separate and apart from all other animals until released by order of the state veterinary surgeon or some person acting by his authority.

RULE 4. An animal must be considered as "suspected" when it has stood in a stable with, or been in contact with an animal known to have the glanders; or if placed in a stable, yard, or other enclosure where a glandered animal has been kept.

RULE 5. Whenever any animal affected with anthrax, glanders or farcy, shall die, or shall be killed, the body of such animal shall be immediately burned, or shall have kerosene poured over it, and buried not less than four feet deep without removal of the hide, or any part of the carcass.

(Reasons for Rule 5.—To prevent the possibility of a recurrence of these diseases from germs existing in the grave which, if not destroyed by some powerful agent, will retain their vitality for a number of years, so as to impart the disease. As they are communicable by inoculation to human beings, great precaution should be used in handling animals affected with this disease.)

RULE 6. No animal diseased with glanders or farcy shall be deemed to have any property value whatever, and no appraisal thereof will be made.

(Reason for Rule 6.—Glanders is an incurable disease, and there is no warrant for expending public money in appraising property manifestly worthless, and which can be compensated for only at "its actual value in its condition when condemned." Also to prevent the introduction of diseased animals into the state, and the inoculation of worthless ones for speculative purposes.)

RULE 7. Whenever the owner, or person having in charge any animal declared by the state veterinary surgeon or other authorized person to have the glanders, shall neglect or refuse to destroy said animal, the premises whereon such animal is kept shall be quarantined until such animal is destroyed and the premises thoroughly disinfected.

QUARANTINE.

RULE 8. The term "quarantine" shall be construed to mean the perfect isolation of all diseased or suspected animals from contact with healthy animals, as well as the exclusion of such healthy animals from the yards, stables, enclosures, or grounds wherever said suspected or diseased animals are, or have been kept.

RULE 9. So-called "piggy" or pregnant sows and rejected cattle found in railway or packing house stockyards must not be sold or delivered to farmers, but held subject to such quarantine as may be deemed necessary to prevent the communication of any contagious disease.

RULE 10. All hogs presented for exhibition at the Iowa State fair and Sioux City fair shall be subject to examination by the state veterinary surgeon before entering the fair grounds, and to daily inspection during the exhibition. Should any animal be found diseased with hog cholera or swine plague, it must be immediately removed to a place of quarantine. The showpens must be cleansed and disinfected under the supervision of the state veterinary surgeon before and during the fair.

RULE 11. In suspected cases of glanders and farcy, when the symptoms do not warrant the state veterinarian in condemning the animal, the mallein test shall be recognized as a valuable diagnostic.

RULE 12. In suspected cases of bovine tuberculosis the tuberculin test shall be recognized as a valuable diagnostic.

DISINFECTION.

Among the most efficient and convenient agents for destroying disease germs are heat, solutions of creolin, carbolic acid, sulphate of iron, caustic

soda, or sulphate of copper, fumes of chlorine, chloride of lime, slaked lime, lime water, whitewash and kerosene oil.

Heat.—This is conveniently applied by means of boiling water or oil, and is especially recommended for disinfecting fabrics of all kinds, leather or wood. Articles of iron or other metals may be purified by heating in a fire. All bedding, litter, excrement, etc., that have accumulated about animals affected with any form of contagious disease, and the carcasses, together with all blood or other fluid elements that have escaped from such carcasses and contaminated soil should be burned, as surest means of eradicating the disease.

Dirt or earth floors of stables wherein animals affected with glanders or anthrax have been kept, should be removed to the depth of four inches, and burned.

SOLUTIONS.

Creolin.—One to fifty or one hundred parts.

Carbolic acid.—Add one part of the acid to five or ten parts of water or oil.

Sulphate of iron, copper and caustic soda.—Add as much of the substance to a given quantity of warm water as will be dissolved.

Whitewash.—For disinfecting interior walls of buildings, feed boxes, mangers, yards, fences, etc., the application of a coating of whitewash prepared from lime in the ordinary way, so thoroughly done as to completely cover every part of the surface designed to be cleansed, is an economical method.

FUMIGANTS.

Chloride of lime.—Chloride of lime and slacked lime for disinfecting floors, yards, carcasses and ground where dead or diseased animals have lain, in fine powder, shall be scattered over the surface of objects to be disinfected thickly, so as to form a complete covering.

Chlorine.—To generate, take peroxide of manganese (to be obtained at any drug store), place in an earthen dish and add one pound of hydrochloric acid (sometimes called muriatic acid) to each four ounces of the peroxide of manganese. Care should be taken not to inhale the gas.

After the floors, walls, etc., of a contaminated building have been cleansed, they should be fumigated by some of the foregoing agents. The doors should be closed and the building otherwise made as tight as possible. Fumes should then be evolved in the building for not less than half a day, and the doors kept closed not less than twenty-four hours, when air and sunlight should be freely admitted.

BURIALS.

Kerosene oil.—Carcasses buried in the earth where there is danger of infection by exhumation by other animals should, previous to burial, be thoroughly covered with quick-lime, or saturated with kerosene oil. This will tend to destroy the virus, and will prevent carnivorous animals disturbing the carcass and thereby spreading the disease.

Freezing.—It has been demonstrated repeatedly in Iowa, that the frosts of winter thoroughly disinfect pasture lands that have been poisoned with the virus of Texas fever by herds of southern cattle during the summer

months. From the first of April to the first of November the virus is likely to retain its vitality, and the strictest precaution is necessary to prevent communication of the disease to northern cattle. The purifying effect of frost, however, cannot be relied upon for destroying the virus of any other disease than Texas fever, liable to attack live stock in Iowa.

It is for the interest of every community, on the appearance of contagious or infectious disease among animals, to adopt speedy measures to eradicate the same, and to co-operate with the state veterinary surgeon in securing such result in the shortest time possible.

J. I. GIBSON,
State Veterinary Surgeon.

Approved January 19, 1898.

J. F. KENNEDY,
Secretary State Board of Health.

J. I. GIBSON,
President State Board of Health.

L. M. SHAW,
G. L. DOBSON,
C. G. MCCARTHY,
JOHN HERRIOTT,
Executive Council.

THE STATUTES.

CHAPTER 14, TITLE 12, CODE.

OF THE STATE VETERINARY SURGEON.

SECTION 2529. The state veterinary surgeon shall be appointed by the governor, subject to removal by him for cause, who shall hold office for three years. He shall be a graduate of some regularly established veterinary college, skilled in that science, and shall be by virtue of his office a member of the state board of health.

SEC. 2530. He shall have supervision of all contagious and infectious diseases among domestic animals in, or being driven or transported through, the state, and is empowered to establish quarantine against animals thus diseased or that have been exposed to others thus diseased, whether within or without the state, and with the concurrence of the state board of health may make such rules and regulations as he may regard necessary for the prevention and suppression, and against the spread of said disease or diseases, which rules and regulations, the executive council concurring, shall be published and enforced, and in the performance of his duties he may call for the assistance of any peace officer.

SEC. 2531. Any person who wilfully hinders, obstructs or resists said veterinary surgeon, his assistants, or any peace officer acting under him or them, when engaged in the duties or exercising the powers herein conferred, or violates any quarantine established by him or them, shall be guilty of a misdemeanor.

SEC. 2532. Said surgeon shall biennially make a full and detailed report of his doings since his last report to the governor, including his compensa-

tion and expenses, which report shall not exceed 150 pages of printed matter.

SEC. 2533. Whenever a majority of any board of supervisors or township trustees, or any city or town council, whether in session or not, shall in writing notify the governor of the prevalence of, or probable danger from, any of said diseases, he shall notify the veterinary surgeon, who shall at once repair to the place designated in said notice and take such action as the exigencies may demand, and the governor may, in case of emergency, appoint a substitute or assistants with like qualifications and with equal powers and compensation.

SEC. 2534. Whenever in the opinion of the state veterinary surgeon the public safety demands the destruction of any stock, the same may be destroyed upon the written order of such surgeon, with the consent of the owner, or upon approval of the governor, and by virtue of such order such surgeon, his deputy or assistant, or any peace officer may destroy such diseased stock, and the owner thereof shall be entitled to receive its actual value in its condition when condemned, to be ascertained and fixed by the state veterinary surgeon and the nearest justice of the peace, who, if unable to agree, shall call upon the nearest, or other justice of the peace upon whom they agree as umpire, and their judgment shall be final when the value of the stock, if not diseased, would not exceed \$25; but in all other cases either party shall have the right of appeal to the district court, but such appeal shall not delay the destruction of the diseased animals. The veterinary surgeon shall at once file with the governor his written report thereof, who shall, if found correct, endorse his finding thereon, whereupon the auditor of state shall issue his warrant therefor upon the treasurer of state, who shall pay the same out of any moneys at his disposal under the provisions of this act, but no compensation shall be allowed for stock destroyed while in transit through or across the state, and the word "stock" as herein used, shall be held to mean cattle, horses, mules and asses.

SEC. 2535. The governor, with the veterinary surgeon, may co-operate with the government of the United States for the objects of this chapter, and the governor may accept and receipt for any moneys receivable by the state under the provisions of any act of congress which may at any time be in force upon this subject and pay the same into the state treasury, to be used according to the act of congress and the provisions of this chapter as nearly as may be.

SEC. 2536. There is annually appropriated out of any moneys, not otherwise appropriated, the sum of \$3,000 or so much thereof as may be necessary for the uses and purposes herein set forth.

SEC. 2537. Any person, except the veterinary surgeon, called upon under the provisions of this chapter, shall be allowed and receive \$2 per day while actually employed.

SEC. 2538. When engaged in the discharge of his duties the veterinary surgeon shall receive the sum of \$5 per day and his actual expenses, the claim therefor to be itemized, verified, accompanied with written vouchers and filed with the state auditor, who shall allow the same and draw his warrant upon the treasury therefor.

CHAPTER 11, TITLE 24, CODE.

DISEASED ANIMALS.

SECTION 5012. If the owner of sheep, or any person having the same in charge, knowingly import or drive into this state sheep having any contagious disease; or knowingly turn out or suffer any sheep having any contagious disease to run at large upon any common, road, or unenclosed lands; or sell or dispose of any sheep, knowing the same to be so diseased, he shall be fined in any sum not less than fifty nor more than one hundred dollars.

SEC. 5013. If any person knowingly import or bring within the state, any horse, mule, or ass, affected by the diseases known as nasal gleet, glanders, or button-farcy, or suffer the same to run at large upon any common, road or unenclosed land, or use or tie the same in any public place, or off his own premises, or sell, trade, or offer for sale or trade any such horse, mule or ass, knowing the same to be so diseased, he shall be fined not less than fifty nor more than one hundred dollars, or be imprisoned not to exceed one year in the county jail, or both.

SEC. 5014. If any horse, mule, or ass, reasonably supposed to be diseased with nasal gleet, glanders, or button-farcy, be found running at large without any known owner, it shall be lawful for the finder thereof to take such horse, mule, or ass, so found, before some justice of the peace, who shall forthwith cause the same to be examined by some veterinary surgeon, or other person skilled in such diseases, and if, on examination, it is ascertained to be so diseased, it shall be lawful for such justice of the peace to order such diseased animal to be immediately destroyed and buried; and the necessary expense accruing under the provisions of this section shall be defrayed out of the county treasury.

SEC. 5015. The owner or person having charge of any swine, any of which die or are killed on account of any disease, shall, upon such fact coming to his knowledge, immediately burn the same.

SEC. 5016. No person shall sell or give away or offer for sale any swine that have died of any disease, or that have been killed on account of any disease.

SEC. 5017. No person shall convey upon or along any public highway or other public ground, or any private land except that owned or leased by him, any diseased swine, or swine that have died of, or have been killed on account of any disease. Upon the trial for the violations of the provisions of this section, the proof that any person has hauled, or is hauling dead swine from a neighborhood in which swine have been dying, or are at the time dying, from any disease, shall be presumptive evidence of his guilt.

SEC. 5018. It shall be unlawful for any person negligently or wilfully to allow his hogs or those under his control infected with any disease, to escape his control or run at large.

SEC. 5019. Any person violating or failing to comply with any provision of the four preceding sections shall be fined not less than \$5 nor more than \$100, or be imprisoned in the county jail not to exceed thirty days or both.

SEC. 5020. Any person driving any cattle into this state, or any agent, servant, employe of any railroad or other corporation, who shall carry, transport or ship any cattle into this state, or any railroad company or other corporation, or person who shall carry, ship or deliver any cattle into this state, or the owner, controller, lessee, or agent, or employe of any stockyard, receiving into such stockyard, or in any other enclosure, for the detention of cattle in transit or shipment, or reshipment, or sale, any cattle brought or shipped in any manner into this state, which at the time they were either driven, brought, shipped or transported into this state, were in such condition as to infect with or to communicate to other cattle pleuro-pneumonia, or splenetic, or Texas fever, shall be fined not less than \$300 and not more than \$1,000, or be imprisoned in the county jail not exceeding six months, or both.

SEC. 5021. Any person who shall be injured or damaged by any acts prohibited in the preceding section, in addition to the remedy therein provided, may recover the actual damages sustained by him, from the person, agent, employe or corporation therein mentioned, and neither said criminal proceeding nor said civil action shall be a bar to a conviction or to a recovery in the other.

SEC. 2343. The board of supervisors of any county, when notified in writing by five or more sheep owners of such county that sheep diseased with scab or any other malignant, contagious disease, exist in such county, shall, at any regular or special meeting, appoint a suitable person as county sheep inspector, who shall take the oath of office, whose duties shall be as hereinafter prescribed, and whose term of office shall be for two years, and until his successor is appointed and qualified.

SEC. 2344. It shall be the duty of the sheep inspector upon the complaint of three or more sheep owners that any sheep within his jurisdiction have the scab or any other malignant, contagious disease, to immediately inspect and report in writing the result of his inspection to the county auditor, to be filed by him for reference by the board of supervisors or any party concerned. And if he deem it necessary in order to prevent the spread of the disease to the sheep of the other owners, he shall command the owner or agent to dip or otherwise treat such diseased sheep, and shall inspect such diseased sheep every month thereafter until such disease shall be eradicated.

SEC. 2345. It shall be the duty of the sheep inspector to dip or otherwise treat such diseased sheep, should the owner or agent refuse to do so, and all costs, expenses and charges, together with a per diem of \$3 per day shall be charged against the owner of such sheep, and shall be a lien thereon, and may be recovered in an action.

SEC. 2346. Such compensation for the inspector shall be \$3 per day, and shall be paid by the owner of the sheep, or his agent, if the disease is found to exist. In case no disease is found to exist the complainants shall pay such fee.

SEC. 2347. Upon the arrival of any flock of sheep within the state from a distance of more than twenty miles outside the boundaries of the state, the owner or agent shall notify the inspector of the county in which such sheep are being held, and he shall inspect the flock at the expense of the owner or agent; and if the sheep are found sound shall furnish the owner

or agent a certificate which shall be a passport to any part of the state; but sheep in transport on board of railroad cars, or passing through the state on such cars, shall not come within the provisions of this section. Any violation of, or failure to comply with the provisions of this and the four preceding sections by the owner of any sheep, shall subject him to a forfeiture of not to exceed \$100, which shall be a lien on such sheep, and shall be recovered in an action by the county attorney in the name and for the use of the county.

SEC. 4979. If any person throw, or cause to be thrown, any dead animal into any river, well, spring, cistern, reservoir, stream or pond, he shall be punished by imprisonment in the county jail not less than ten nor more than thirty days, or by fine not less than \$5 nor more than \$100.

SEC. 4982. If any person knowingly sell any kind of diseased, corrupted, or unwholesome provisions, whether for meat or drink, without making the same fully known to the buyer, he shall be imprisoned in the county jail not more than thirty days, or by fine not exceeding \$100.

The flesh of pregnant animals must not be sold nor used for human food after the seventh month of pregnancy for cows, and the tenth week for sows.—Regulations of the State Board of Health.

